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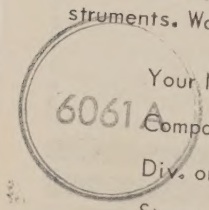

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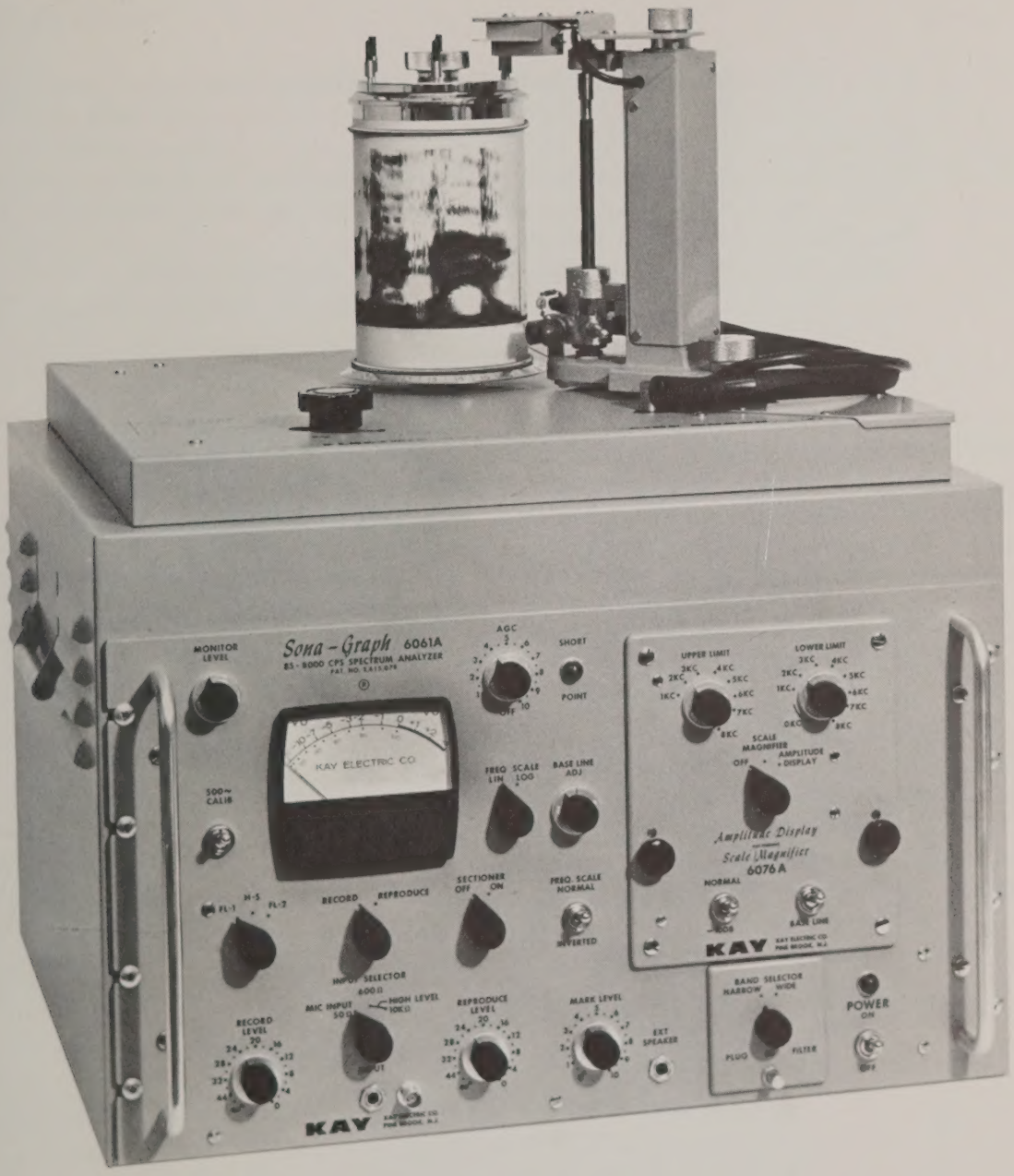
MAINTENANCE MANUAL
ISSUE A

MAY 1966



SONA-GRAPH 6061A

KAY ELECTRIC COMPANY
PINE BROOK, NEW JERSEY
(201) 227-2000

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SECTION I
PRELIMINARY INFORMATION

1.1 INTRODUCTION

This manual presents information for the maintenance and alignment of the SONA-GRAPH 6061-A and the 6076-A, AMPLITUDE DISPLAY AND SCALE MAGNIFIER plug-in-unit. The specifications and operation procedures can be found in the OPERATOR'S MANUAL. For this discussion, reference may be made to the Functional Block Diagram, (Fig. 1.1), and to the Schematic Diagrams in the rear of this manual.

1.2 CIRCUIT DESCRIPTION, OVERALL

Record Mode:

The signal to be analyzed is fed into the MICROPHONE INPUT jack, which is the input to the record amplifier. The amplified signal is then applied to both the record head and the monitoring circuitry. Since the erase head is biased, the tape is always clean before it passes by the record head. Therefore, a continuous process of record and erase is taking place. Depressing the 500 CPS pushbutton feeds a calibration tone into the record amplifier, along with the input signal. The monitoring system permits the recorded and reproduced signals to be observed on the VU meter and heard on the speaker.

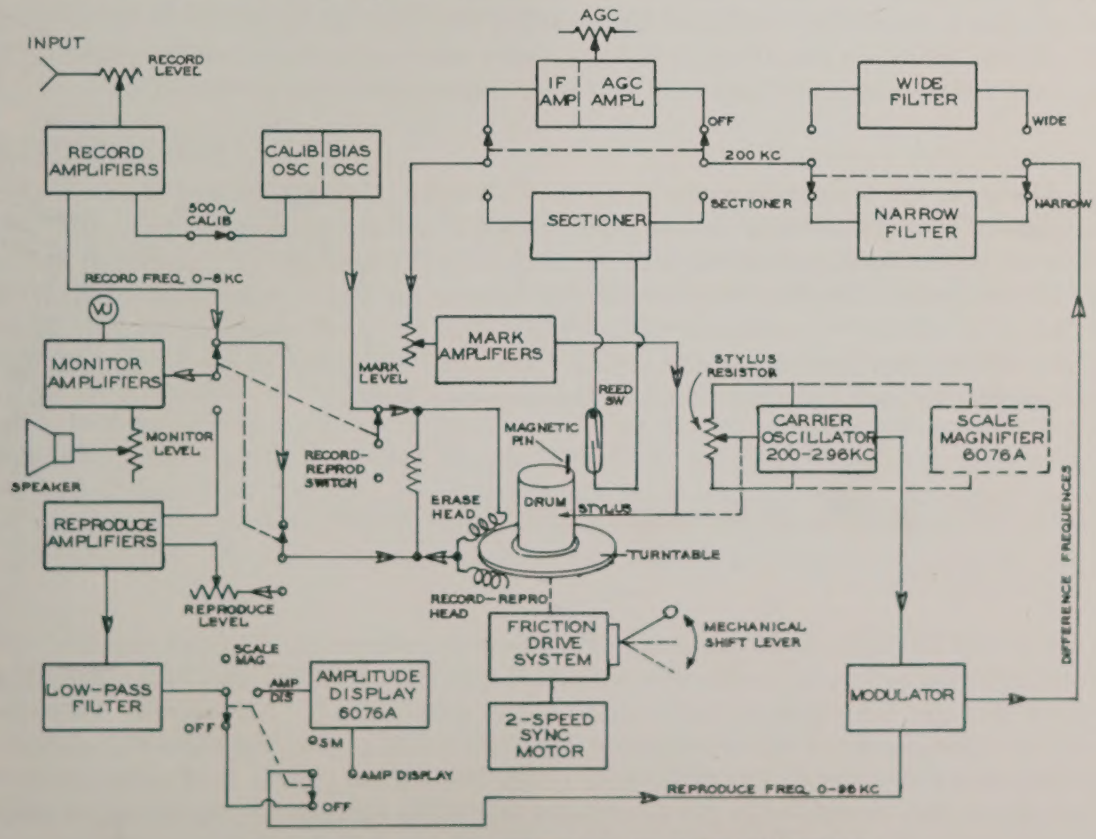


FIGURE 1.1 FUNCTIONAL BLOCK DIAGRAM

Reproduce Mode:

As soon as the SONA-GRAPH is switched to the reproduce mode, the bias is removed from the erase head. This allows the last 2.4 seconds of recorded information to remain on the tape. The shift lever on the mechanical portion of the 6061-A is placed in the REPROD position. The recorded signal is now being played back continuously at a speed of 300 RPM, (12 times faster than the record speed). As a result of this, a signal of 2 KC, for instance, would be reproduced as a frequency of 24 KC. Now the signal is amplified by the reproduce amplifier and passes through a low-pass filter whose cutoff frequency is 96 KC. This filter limits the range of the SONA-GRAPH to 8 KC maximum, (96 KC divided by 12). The output of the low-pass filter is fed to one input of a balanced modulator. The second modulator input is obtained from the variable-carrier oscillator which has a range of 200 to 296 KC. When the stylus is at the bottom of its travel, the oscillator frequency is 200 KC; as the stylus moves up the paper, the frequency increases to 296 KC at the upper extreme. The balanced modulator mixes the reproduced signal with the carrier oscillator and the resultant signal is fed to the NARROW - WIDE filters which have a center frequency of 200 KC.

This process of mixing and filtering enables the SONA-GRAPH to scan the recorded signal. As an example, assume that a constant tone of 5 KC has been recorded. When this signal is played back and fed into the balanced modulator, it will have been increased to 60 KC. The stylus is now set at the bottom of the paper, causing the carrier oscillator to generate 200 KC. Thus, the output of the balanced modulator consists of the sum and the difference frequencies, (260 KC and 140 KC). The 200 KC filter will not pass either of these signals; therefore, the mark amplifier receives no input and there is no indication shown on the Sonagram paper. This process will continue, as the stylus is driven up the paper, until the stylus reaches a point that produces a carrier oscillator frequency of 260 KC. As a result; the filter passes the 200 KC signal, the mark amplifier is driven, and a mark is produced on the paper. When the stylus passes this point, the filter will reject all signals as it did previously.

The dynamic range of the Sonagram paper is 10 DB; however, through the use of the AGC circuit, input signals up to 40 DB may be analyzed. When a section is being made, signals up to 35 DB can be displayed, (eliminating the need for the AGC). A reed switch, activated by magnetic pins on the drum, enables the sectioner to sample the signal under examination. The output of the AGC circuit or sectioner is then applied to the mark amplifier which furnishes the necessary voltage and current for the stylus. Since the Sonagram paper is current sensitive, as the signal strength increases the pattern becomes darker.

1.3 CIRCUIT DESCRIPTION, AMPLIFIER-ANALYZER SYSTEM

RECORD-AMPLIFIERS

RECORD PRE-AMPLIFIER, Q-1401, provides for low-impedance (MIC) input signals. When the INPUT SELECTOR switch is in either of the HIGH LEVEL positions, the PRE-AMPLIFIER stage is bypassed and the signal is fed directly to the RECORD LEVEL control. This attenuated signal is then passed to the input of the RECORD AMPLIFIER, (Module #1). Amplifier Q-101 and associated bootstrap circuit provide a high-impedance input. A shaping network is employed in the emitter circuit of Q-101 for the HS and FL-2 analyses. The signal is coupled to dual-purpose stage of Q-102. The low-impedance emitter output is direct-coupled to ampli-

fier Q-103, whose output is passed to the monitor amplifiers for monitoring purposes. The collector output provides gain for amplifiers Q-104 and Q-105. The signal is then fed to the RECORD-REPRODUCE head and impressed on the magnetic plating of the turntable. A feedback path is employed from the head to the emitter circuit of Q-104, providing a high-frequency pre-emphasis. R-126 and C-115 provide a frequency-variable feedback and give the desired increase in record head current at high frequencies. Tuned circuits -- L-101, C-112 and L-1501, C-1503, C-1504 are utilized to keep 75 KC bias signals from feeding back into the RECORD AMPLIFIERS.

BIAS AND CALIBRATE OSCILLATOR

Record-Erase Bias Oscillator, Q-604, Q-605, is activated either when the RECORD-REPRODUCE switch is in the RECORD position or when the CALIB switch is depressed. The oscillator produces a bias frequency of approximately 75 KC. The output is fed to the head assembly and adjusted so that current is applied through the RECORD and ERASE heads. As both heads are biased simultaneously, a continuous process of recording and erasing is taking place until the RECORD-REPRODUCE switch is placed in REPRODUCE. At this time, the last 2.4 seconds of recorded signal is "captured" on the turntable.

Phase-shift oscillator, Q-603, is tuned to produce a 500 CPS sine wave which, after being amplified and clipped by Q-602, is differentiated in the collector circuit of Q-602. The signal is then amplified and inverted by Q-601 and fed to the RECORD AMPLIFIER board. The entire RECORD circuit is activated when the CALIB switch is depressed, thus passing the 500 CPS tone through the record amplifiers and impressing it on the turntable.

REPRODUCE AMPLIFIERS

REPRODUCE PRE-AMPLIFIER, Q-1601 provides a high-impedance input and high-frequency pre-emphasis. Emitter Follower, Q-1602, utilizes a 200 KC trap in its output circuit which filters out any 200 KC signals. After being attenuated by the REPRODUCE LEVEL control, the signal is fed to the REPRODUCE AMPLIFIER, (Module #2). Amplifier Q-201 and associated bootstrap circuit provide a high-impedance input. The signal is then coupled to a gain stage , Q-202, and emitter follower, Q-203. A feedback path between the output and the emitter of Q-201 is used in conjunction with R-212 and C-205 to provide the desired low-frequency pre-emphasis. The output is passed to the LOW PASS FILTER which is tuned to reject all frequencies above 96 KC. (8 KC, the upper frequency limit, times 12, the speed-up ratio of the mechanical drive system, equals 96 KC, the frequency range of the reproduce circuits of the SONA-GRAPH). The FL-2 shaping network is located at the output of the LOW PASS FILTER.

MONITOR & VU AMPLIFIER

A portion of the REPRODUCE OUTPUT is passed to the INPUT of the MONITOR & VU AMPLIFIER, (Module #3). Q-301, emitter follower, is activated only in REPRODUCE. In the RECORD mode, the signal is passed directly to the base of Q-302 where either recorded or reproduced signals are amplified and fed to VU meter, M-1. Diodes CR-1201 through CR-1206 protect

the meter from transients encountered when switching the mode of operation from RECORD to REPRODUCE and vice-versa. The MONITOR LEVEL controls the amount of signal applied to the base of the amplifier, Q-303. The signal then passes through emitter follower, Q-304, audio power amplifier, Q-305, and is impressed across output transformer, T-2, which matches the impedance of the speaker. A portion of the AUDIO OUTPUT is fed back to the emitter of Q-303, thus controlling the audible signal. The EXT SPEAKER, when utilized, will disable the internal speaker.

CARRIER OSCILLATOR & MODULATOR

The REPRODUCE OUTPUT is also fed through emitter follower, Q-401, to modulator transformer, T-402. At the same time, a voltage is impressed across the two legs of resistor, R-9, located in the stylus housing. The wiper contact of this resistor is mechanically linked to the Stylus Control and, as it moves up the Lead Screw, causes a constant voltage change at varactors, C-416 and C-417. This in turn causes the capacitance of the varactors and the frequency of Wien-Bridge Oscillator, Q-403 through Q-405, to vary in proportion. In the LINEAR mode of operation, LIN UPPER and LIN LOWER limit pots, R-1702 and R-1707, provide the proper voltage spread across the stylus resistor. Q-1701 provides the necessary voltage shaping needed to obtain uniform frequency variation with given stylus changes. In the LOG mode, R-1704, LOG UPPER, and R-1708, LOG LOWER limit pots control the voltage spread, while I-1701, a voltage variable resistance, provides a logarithmic voltage swing as the stylus moves up the lead screw. The output of the oscillator, (200 KC - 296 KC), is amplified by Q-402, and applied to modulator transformer, T-402. The sum, difference and carrier frequencies are present at the output of balanced modulator, CR-401 through CR-404. (A perfectly balanced modulator would permit no carrier leak; however, the modulator has been purposely unbalanced to provide a reference baseline when the stylus is just above the lower SHORT POINT). Q-1001, in the PLUG-IN FILTER, provides the correct impedance match for crystal filters, FL-1001 and FL-1002, and compensates for the different insertion loss of these two filters. Both filters are tuned to pass only 200 KC at the effective bandwidths of 45 CPS and 300 CPS referred to the record speed. (The actual filter bandwidths are 12 times these frequencies). Therefore, only the carrier leak and difference frequencies of 200 KC will be amplified and present at the output. Q-1002 matches the output impedance of the filters and provides additional gain.

AGC AMPLIFIER

The output of the PLUG-IN FILTER may be selected to take one of two paths. When producing a #1 display and AGC action is desired, the signal is fed to the input of AGC & IF Module #5, where it is passed through three transformer-coupled amplifiers, Q-501, Q-502 and Q-503. The output of Q-503 is coupled to amplifier, Q-505 and emitter follower, Q-504. This signal is then rectified and controls the biasing on the bases of Q-501 and Q-502 and, thus, the gain of these stages. CR-501, in conjunction with the AGC control, determine the AGC cut-out point. With this control set at maximum, (#10), the AGC action will be utilized to compress a full 40 DB of input to 10 DB, the range of the paper. For lower AGC control settings, the action will be cut out sooner, thus providing less compression.

When the AGC control is turned off, the filter output is fed to the base of Q-503, amplified, and passed to the IF OUTPUT; no compression is obtained.

SECTIONER

To produce a #2 display, (SECTION), the FILTER OUTPUT is fed to the input of the SECTIONER, (Module #8). Here the signal is passed through a series of amplifiers, rectified, and fed to the normally open contact of the Mercury-wetted relay, RV-801, in the form of a negative DC voltage, proportional to the amplitude of the input signal. This voltage charges capacitor C-805. The reed switch, S-11, mounted on the top of the stylus housing, is normally in the open position. When a magnetic pin passes the reed switch, the circuit is closed and the mercury-wetted relay is energized. The voltage on C-805 places a charge on C-807. When the magnetic pin has passed the reed switch, the relay is de-energized and C-807 discharges through R-812 and R-813, producing the familiar exponential decay curve at the base of emitter follower, Q-804. Q-805 acts effectively as a switch, which, under no signal conditions, shorts the base of Q-806. When the negative exponential signal appears, Q-805 is cut off, thus removing the short from Q-806. This allows Q-806, operating in conjunction with Q-807, to function as a multivibrator which oscillates at 200 KC. The resultant output is a pulse, proportional in length to the amplitude of the input signal, (measured in DB), when a magnetic pin passes the reed switch. When the SECTIONER switch is ON, the voltages across the stylus resistor are inverted, thus producing a range of 8 KC at the lower SHORT POINT to 0 KC, (baseline), at the upper SHORT POINT.

MARK AMPLIFIER

The output of either the SECTIONER or AGC circuits, depending on the mode of operation, is passed through the MARK LEVEL control to the input of the MARK AMPLIFIER. This 200 KC signal is taken from Q-701, which provides some gain, and passed to push-pull amplifiers, Q-702 and Q-703. It is then transformer-coupled to power amplifiers, Q-704 and Q-705. The outputs of these stages are impressed across transformer T-1, which steps up the RF signal to approximately 1000 volts, needed to burn the Sonagram paper.

1.4 DESCRIPTION, MECHANICAL SYSTEM

RECORD-REPRODUCE AND ERASE HEADS

Fig. 1.2 shows the manner in which the heads are mounted and make contact with the turntable. Two heads are employed:- PU-1 is used for recording and reproducing; PU-2 for erasing Both heads must be in intimate contact with the recording surface at all times. A ratchet control is provided at the pivot point of each of the heads for the adjustment of head pressure.

TURNTABLE AND DRIVE SYSTEM

The outer rim of the turntable is surfaced with a magnetic plating which is used for a recording medium. A synchronous, 2-speed motor, in conjunction with a friction drive system, causes the turntable to rotate at 25 RPM when recording, and a 300 RPM when reproducing. The RECORD-REPRODUCE SHIFT LEVER selects the desired speed and activates the amplifier-analyzer circuits and the blower motor.

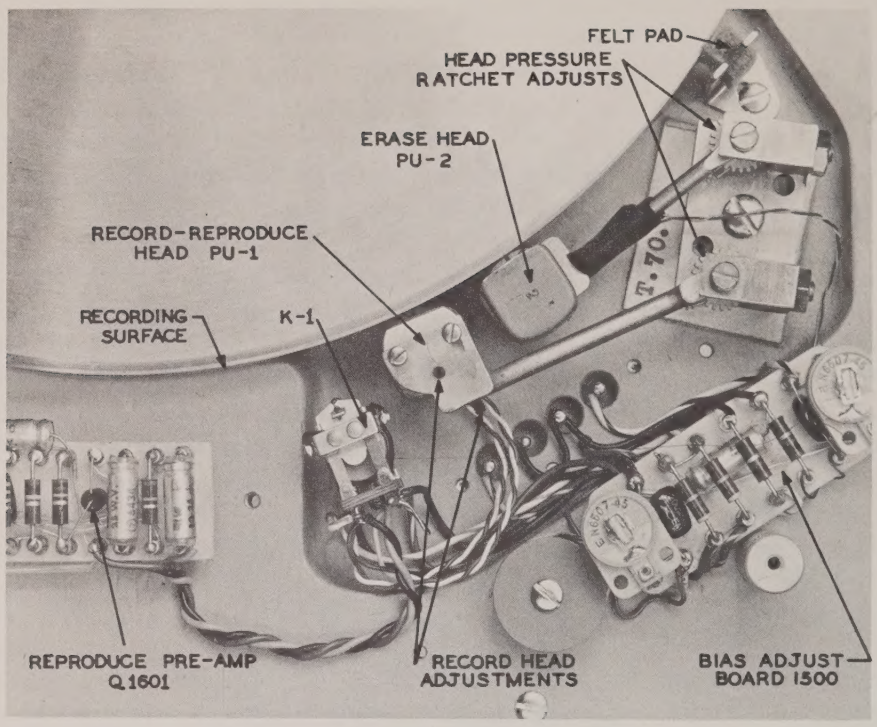


FIGURE 1.2 MECHANICAL RECORD-REPRODUCE SYSTEM

STYLUS ASSEMBLY AND DRUM

The small drum, on which the Sonagram paper is placed, is approximately 4" in diameter and 7" high. A micrometer plate, the drum and the turntable are locked together with a large knurled nut, mounted on the top of the micrometer plate. The drum and turntable, being keyed to a common axis, rotate in synchronism. Two rolling springs are provided to hold the Sonagram in place around the drum. The lead screw, mounted on the stylus housing, is coupled to the drum assembly through a gear and pulley system. The gear ratio controlling the lead screw is such that 96 lines are produced on the Sonagram as the stylus moves one inch up the lead screw. The stylus itself is a length of 10 mil stainless steel wire, mounted in the throat of the hard rubber, fume exhaust tube. A bakelite disc, on the rear of the exhaust tube, permits the operator to adjust the stylus pressure.

The stylus assembly also includes provisions for controlling the frequency limits of the SONAGRAPH. An arm of the stylus control lever extends into the stylus housing and controls two wiper contacts. One contact moves up a wire-wound resistor, R-9, thus controlling the varactor bias and the frequency of the carrier oscillator. The second contact moves up a bakelite strip which contains two grounded terminals approximately 4" apart. When the stylus control reaches either of these short points, the input of the MARK AMPLIFIER board is shorted to ground, preventing any stylus marking and causing SHORT POINT indicator, I-1, to light.

The REED SWITCH BLOCK AND POINTER, both a part of the SECTIONER circuit, are located on the top of the stylus housing. When the SECTIONER circuits are activated, a magnetic pin passing the reed switch will close the circuit and energize relay RV-801 in the sectioner circuits. The pointer can be utilized in conjunction with the stylus wire to SECTION a pre-selected portion of a #1 display.

BLOWER MOTOR ASSEMBLY

In the process of making a Sonagram, a considerable amount of smoke is generated. This smoke is drawn off via the hard rubber tube on the stylus holder and is passed through a flexible rubber tube which terminates at the filter and blower motor assembly.

1.5 CIRCUIT DESCRIPTION, AMPLITUDE DISPLAY/SCALE MAGNIFIER, 6076-A

When the SCALE MAGNIFIER-AMPLITUDE DISPLAY selector is in the AMPLITUDE DISPLAY position, the reproduce output is applied to the base of amplifier Q-1101. With the NORMAL — -10 DB switch in the -10 DB position, a voltage divider is inserted in the input circuit, providing 10 DB of attenuation. The output of Q-1101 is passed to phase-splitter Q-1102. Two outputs, the emitter in phase, and collector 180° out of phase with the input, are fed to amplifiers Q-1104 and Q-1103, respectively. A portion of the output of Q-1104 is shaped by CR-1101 through CR-1104, and fed back to the base of Q-1102. The outputs of Q-1103 and Q-1104 are fed to rectifiers CR-1106 and CR-1105. This signal is then filtered and a DC control voltage is present at varactors C-1124 and C-1125.

When the BASELINE switch is depressed, the base of Q-1101 is grounded, thus allowing no signal to pass. The oscillator frequency in this condition, is adjusted so that Wien-Bridge oscillator, (Q-1105, Q-1106, and Q-1107), produces a baseline frequency of 62 KC. As the BASELINE switch is released, any fluctuation of the input amplitude, (in DB), will cause a proportional, linear change in frequency at the output of the oscillator.

When the SCALE MAGNIFIER-AMPLITUDE DISPLAY switch is in the SCALE MAGNIFIER position, the UPPER and LOWER LIMIT controls are placed at their respective ends of the stylus resistor, R-9. The wiper of this resistor is connected to the base of Q-1108. The UPPER and LOWER LIMIT controls thus determine the voltage spread present at Q-1108. These voltages are then passed through the emitter follower and zener diode shaping network, CR-1109 through CR-1111, which provide for the desired carrier oscillator frequency change with a corresponding change in position of the stylus control.

SECTION II
ALIGNMENT PROCEDURES

2.1 INTRODUCTION

This section contains all the information necessary to complete a factory alignment of the SONA-GRAPH, 6061-A and the 6076-A plug-in unit. If any problems are encountered while performing these alignment checks, consult the maintenance section for possible malfunctions.

2.2 FUNCTION OF INTERNAL CONTROLS, 6061-A

CONTROL	COMPONENT	FUNCTION
B+ ADJ	R-908	Adjusts the proper 18V output from the power supply.
LOG UPPER LIMIT LOG LOWER LIMIT LIN UPPER LIMIT LIN LOWER LIMIT	R-1704 R-1708 R-1702 R-1707	Adjustments for setting the proper voltages at the top and bottom of the stylus resistor to provide correct frequency spread.
BIAS ON-OFF switch	S-1 (OFF)	De-activates the bias oscillator circuits, (used during alignment of record circuits).
BIAS ADJ	C-1502	Controls amount of bias applied to the record head.
75KC TRAP ADJ	C-1504	Keeps 75KC bias signals from feeding back into the record amplifiers.
200KC TRAP ADJ	L-1601	Tuned to keep 200KC signals out of the reproduce amplifier.
RECORD VU ADJ REPRODUCE VU ADJ	R-302 R-303	Control the amount of record and reproduce signal present at the VU meter.
MODULATOR BALANCE	R-407	Provides the correct balance between the carrier and reproduce frequencies.
FEEDBACK ADJ	R-415	Controls the amount of negative feedback required to cause the carrier oscillator to oscillate.

CONTROL	COMPONENT	FUNCTION
0 DB ADJ 20 DB ADJ 40 DB ADJ	R-503 R-509 R-524	Controls AGC diode action. Controls IF amplifier gain. Controls AGC amplifier gain.
500 CPS ADJ	R-618	Controls frequency of the calibration oscillator.
CALIB OUTPUT ADJ	R-607	Adjusts the gain of the calibration output stage.
MAXIMUM AMPL ADJ	R-812	Controls the maximum length of the sectioner pulse.
MINIMUM AMPL ADJ	R-824	Controls the minimum length of the sectioner pulse.

2.3 ALIGNMENT PROCEDURE, SONA-GRAPH, 6061-A

Equipment Required:

Oscilloscope, Tektronix 503, or equiv.
AC Voltmeter, Ballantine, Mod #861, or equiv.
Attenuator, 70 OHM, Kay Mod 21-0.
Frequency Counter, Berkeley/Beckman Mod #554 or equiv.
Audio Oscillator, Hewlett-Packard, Mod 200C or equiv.
DC Voltmeter, RCA Voltohmyst, or equiv.

A. POWER SUPPLY

1. Connect a VTVM and oscilloscope across C6, and check for +18 volts with less than 2 mv p-p ripple. Adjust R908 if necessary.

2. Connect the VTVM and oscilloscope across CR-912, and check for -6.8 volts with less than 10 mv p-p ripple. This voltage should be within ± 10%.

3. Measure between the (-) side of C905 and ground; check for -36 volts with less than 2 volts p-p ripple. This voltage should be within ± 20%.

NOTE: If any printed circuit modules are plugged in or taken out of the Sona-Graph, make certain the unit is turned off. This is to prevent transients from damaging the semiconductors.

B. RECORD BIAS

1. Turn the bias switch, at the rear of the electrical unit, to ON.

2. Turn the RECORD-REPRODUCE switch to RECORD, and the Mechanical Shift Lever to RECORD.

3. Connect one lead of a wide-band AC voltmeter to the relay side of R1501 (on the Bias-Erase terminal board), and connect the other meter lead to ground.

4. Tune C1502 to obtain a 3.2-volt RMS reading on the meter.

5. Connect the scope, with a high-impedance probe, to the RECORD OUTPUT test jack.

6. Tune C1504 for a minimum reading on the scope (3 volts p-p or less).

C. CALIBRATE TONE

1. Connect both a scope and counter to the CALIB OUT test jack.

2. Adjust R618 for a reading of 500 CPS on the counter.

3. Finally, adjust R607 for a 1 volt p-p signal on the oscilloscope.

D. 200 KC TRAP

1. Turn the Bias switch at the rear of the unit to OFF, the Mechanical Shift Lever to OFF, and the RECORD-REPRODUCE switch to REPRODUCE.

2. Connect a 200 KC oscillator (240 mv p-p) to the (-) side of C1601 in the Reproduce Preamplifier.

3. Connect the scope to the junction of R1607 and L-1601, and tune L-1601 for a minimum reading on the scope.

E. CARRIER OSCILLATOR

1. Set the MARK LEVEL control at (0), and the BASELINE control at midpoint.

2. Connect a counter to the CARRIER OSCILLATOR test jack through a 100K resistor.

3. Move the Stylus to the top of its travel; then slowly bring it down until the SHORT POINT light goes out. Partially engage the Stylus. (DO NOT ALLOW THE STYLUS WIRE TO TOUCH THE DRUM).

4. Turn the FREQ SCALE to the LIN position.

5. Connect the positive lead of a VTVM to the junction of C-416 and C-417 (on module #4), and the negative lead to chassis ground. Then adjust the Lin Upper pot (R-1702) for a 10-volt meter reading.

6. Remove the VTVM and adjust R415 to obtain a 296.7 KC reading on the counter. Succeeding 296.7 KC linear adjustments are to be done with LIN UPPER CONTROL.

7. Switch the FREQ SCALE selector to the LOG position, and adjust the Log Upper pot (R-1704) to obtain 296.7 KC.

8. Lower the Stylus ot the bottom of its travel; then slowly raise it until the SHORT POINT light just goes out. Partially engage the Stylus.

9. Adjust the Log Lower pot (R-1708) to obtain 199.7 KC on the counter.

10. Turn the FREQ SCALE switch to the LIN position, and adjust the Lin Lower pot (R-1707) to obtain a 199.7 KC reading.

11. Recheck the upper limit frequencies, and readjust the pots if necessary. (Do not readjust R415)

F. RECORD-REPRODUCE HEAD

1. Turn the shaping selector to FL-1, and the Bias switch (rear of unit) to OFF.

2. Then turn the RECORD-REPRODUCE switch to RECORD, and the RECORD LEVEL control to approximately (20).

3. Feed in a 2.5 KC signal and turn the INPUT SELECTOR to the appropriate matching impedance.

4. Monitor the junction of R1501 and the relay, on mechanical unit, with a wide-band AC voltmeter. Adjust the input to obtain a reading of 240 mv rms (corresponds to an input signal of about 300 mv p-p).

5. Turn the Bias switch to ON, place the Mechanical Shift Lever in RECORD, and record the 2.5 KC signal.

6. Now monitor the head output, in REPRODUCE, by connecting the AC voltmeter to the input of the Reproduce Preamplifier. Adjust the two Allen screws for a reading of 27 DB (Min.) above 1 mv. Re-record 2.5 KC signal after each adjustment.

7. If this reading cannot be obtained in the above step, the bias noted in Step B4 may be varied slightly (± 10%) to obtain the proper output.

G. SYSTEM FLATNESS

1. Set the selector switch to FL-1, and the INPUT SELECTOR to the correct matching impedance for the CW oscillator.

2. Set the RECORD-REPRODUCE switch to RECORD, the Bias switch to OFF, and the Mechanical Shift Lever to RECORD.

3. With the AC voltmeter on the relay side of R1501, apply a 2.5 KC signal to the INPUT jack and set the oscillator for a 240 mv rms reading on the meter.

4. Check to see that there is a zero VU reading on the panel meter. If the reading is improper, adjust R302 (Module #3) to obtain zero VU.

5. Return the Bias switch to ON, and record the 2.5 KC signal.

6. Reproduce the signal in the normal manner, and monitor the REPRODUCE OUTPUT test jack with the AC voltmeter.

7. Set the REPRODUCE LEVEL control to obtain approximately 80 mv volts rms on the meter.

8. Maintaining the same input level, record and reproduce signal frequencies throughout the range of the 6061-A. The AC voltmeter readings should not vary by more than ± 2 DB over the entire range (Fig. 2-1).

9. If the flatness is slightly out of specification, the bias level may be changed by a small amount (± 10%) to improve the response. In addition, C1603 in the Reproduce Preamplifier, affects the high frequency end of the response any may be adjusted if necessary.

NOTE: It should be ascertained that the Record-Reproduce heads and the recording surface are clean before performing Steps F & G.

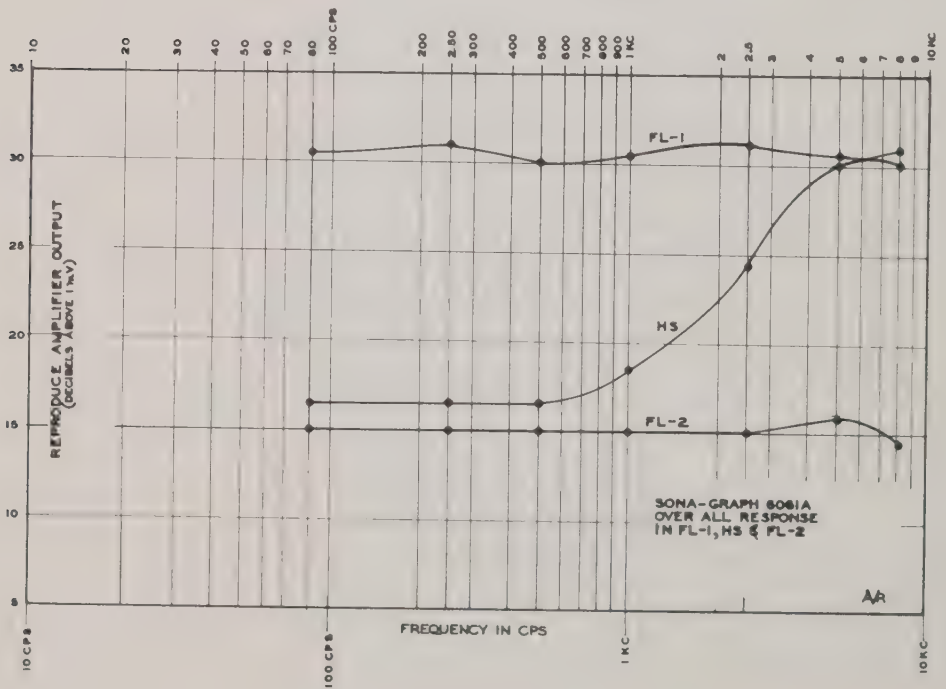


FIGURE 2.1A

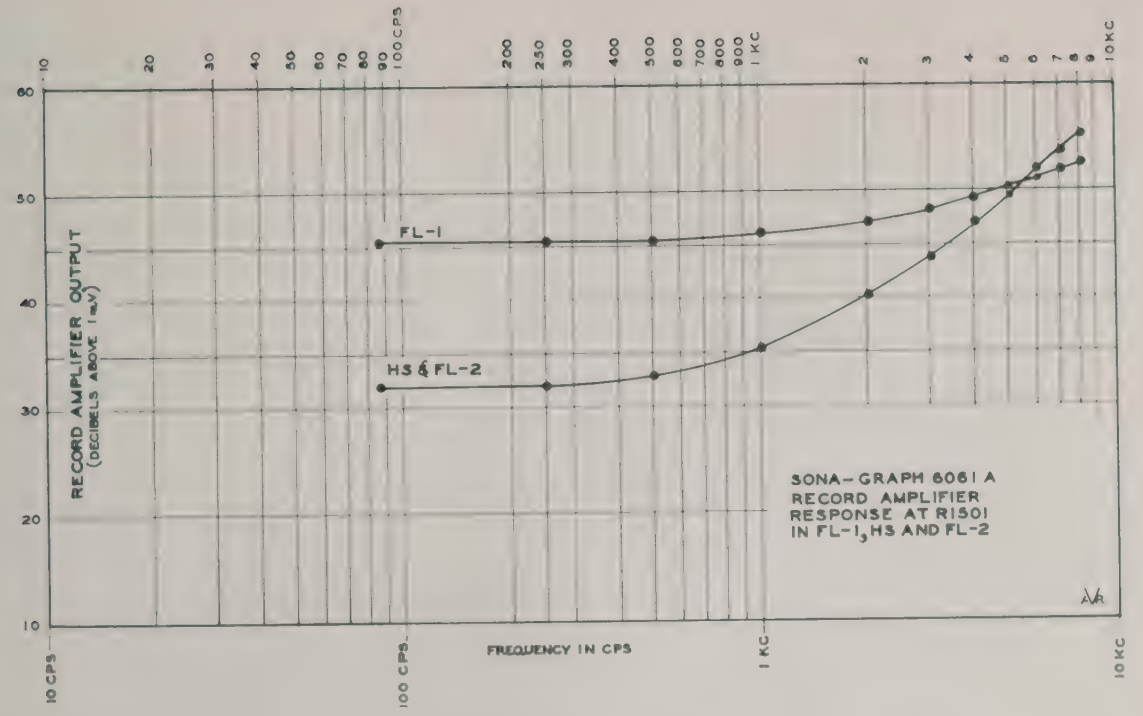


FIGURE 2.1B

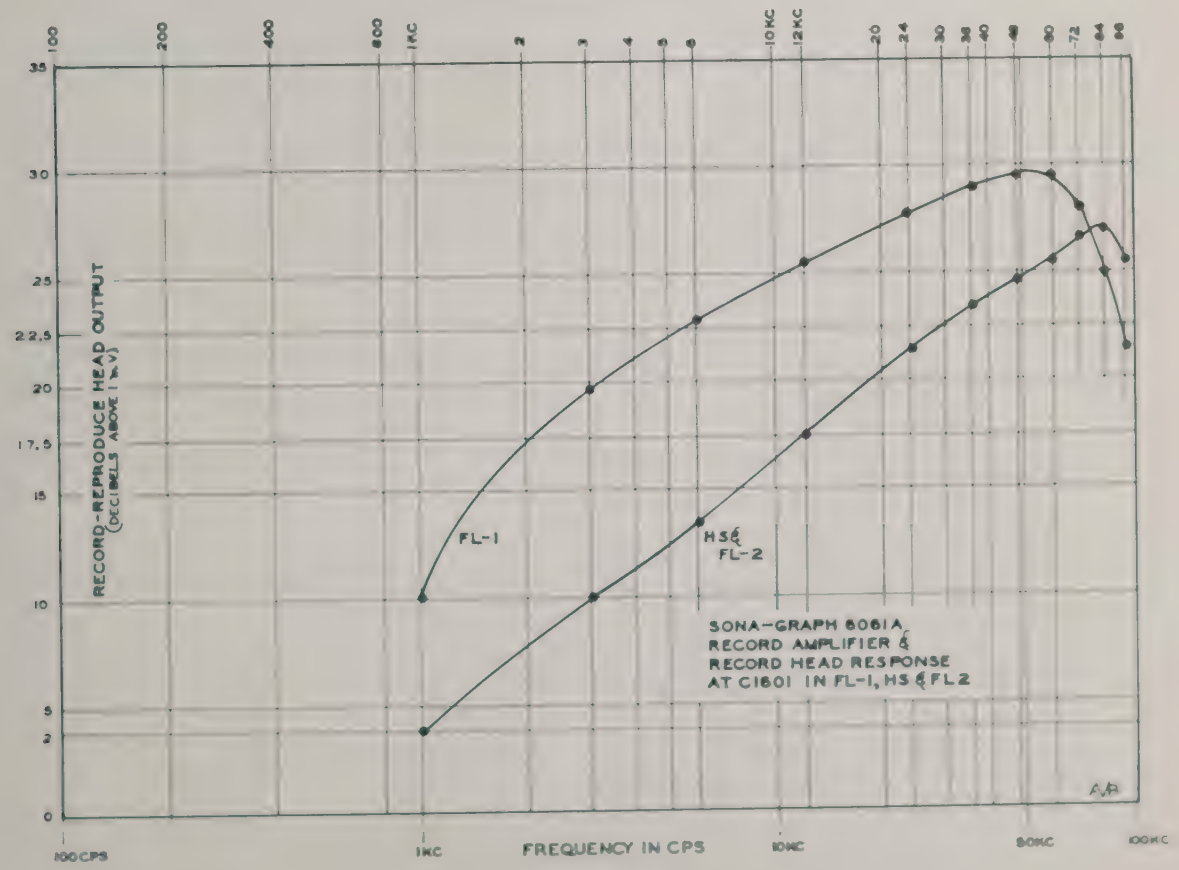


FIGURE 2.1C

H. REPRODUCE VU METER

1. Leave the 6061-A set up as it was for the System Flatness check (the 2.5 KC signal being played back continuously).

2. Connect vert of scope to FILTER OUT jack. Lift the Stylus to a point where an IF output is observed on the scope. This will occur approximately one-third the way up the Lead Screw.

3. Move the Stylus carefully until the peak output is noted; then turn the REPRODUCE LEVEL control to obtain 0.55 volts p-p (± 10%) on the scope.

4. The Stylus may now be returned to its rest position.

5. Adjust R303 (Reproduce VU Level) Module #3 to obtain a reading of (-2) on the front-panel VU meter.

6. Check the level at the REPRODUCE OUTPUT test jack; it should be from 200 to 270 mv p-p.

I. AGC

1. Switch the 6061-A to the REPRODUCE mode.

2. Remove the 200 KC filter plug-in from the 6061-A. Raise the stylus to a point midway between short points and set the mark level to zero.

3. Connect the equipment as shown in Fig. 2-2.

4. Set the output of the oscillator to obtain a reading of 0.55 volt p-p on the scope (with no attenuation in the circuit).

5. Connect a wide-band AC voltmeter to the IF OUTPUT test jack, and switch in 40 DB of attenuation. Set the AGC control at maximum, and adjust T-501 & T-502 (Module #5) for maximum output.

6. Now adjust R509 (Module #5) to produce a reading of 2 DB below 0.1 volt rms on the AC voltmeter.

7. Remove 20 DB of attenuation from the circuit, and adjust R524 so that the output increases by about 7 DB from the -40 DB level.

8. Remove all attenuation from the circuit, and adjust R503 until the output increases by about 3 DB over the -20 DB level.

9. Repeat the three preceding steps until the best results are obtained.

10. Reset the AGC control at minimum; the voltmeter should now read 1.5 volts rms ± 3 DB. When 20 DB of attenuation is put in, the meter reading should change by approximately 10 DB.

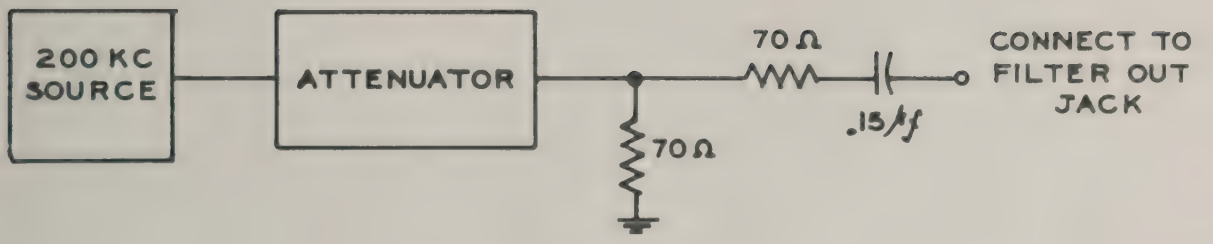


FIGURE 2.2

11. Reset the AGC in the OFF position. Remove the 20 DB attenuation. The voltmeter should now read approximately 1.3 volts, rms.

J. MODULATOR BALANCE

1. See that the 6061-A is in the REPRODUCE mode and the BAND SELECTOR is in the NARROW position.

2. Lift the Stylus to a point just above the position where the SHORT POINT indicator goes out.

3. Connect an oscilloscope to the FILTER OUTPUT test jack, and rotate the BASELINE control to obtain a peak reading on the scope.

4. Now adjust R407 (Module #4) for a reading of approximately 150 mv p-p, while continuously varing the BASELINE control for peak output.

K. SECTIONER

1. Place the power switch in the OFF position.

2. Install six magnetic pins equally spaced around the top of the Sectioner Micrometer Plate. Loosen the two screws securing the Reed Switch Block to the Sectioner and slide the Reed Switch Block and Pointer towards the Drum. Slowly rotate the Drum by hand and position the Reed Switch Contact so that it is approximately 1/16" from the passing magnetic pin, (Fig. 2-3). Rotate the Drum 360° and see that all pins clear the switch contact by at least 1/32".

   NOTE: If the magnetic pins pass too close to the Reed Switch Contact, the switch may tend to "Hang" in a closed position; if the switch is too far from the pins, the Reed Switch may fail to close.

3. Connect the equipment as described in Step I.

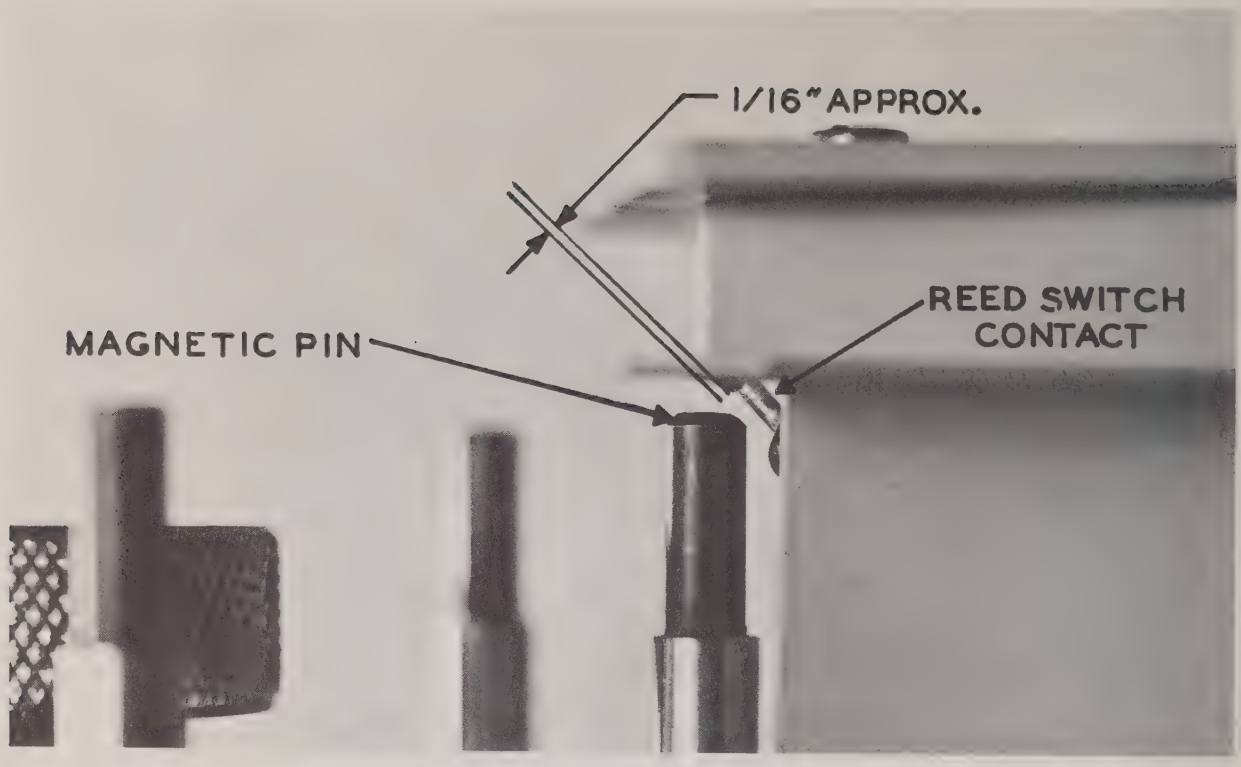


FIGURE 2.3 PROPER REED SWITCH BLOCK ADJUSTMENT

4. Place the POWER and SECTIONER switches in the ON position. Place the mechanical shift lever in the reproduce position.

5. Connect the scope to the base of Q803 and adjust the output of the oscillator form negative 35V peak exponential. (The input should be approximately .55 volts peak to peak).

6. Connect the scope to the SECTIONER OUT jack and adjust R812 for a pulse width of 21.0 ms.

7. Switch in 35 DB of attenuation and adjust R824 for a pulse width of 0.3 ms.

8. Repeat steps 6 & 7 until the proper results are obtained.

2.4 ALIGNMENT PROCEDURE - AMPLITUDE DISPLAY/SCALE MAGNIFIER, (6076-A)

A. EQUIPMENT REQUIRED:

Sona-Graph, 6061-A
Frequency Counter, Berkeley/Beckman Mod. #554, or equiv.
Oscilloscope, Tektronix 503, or equiv.
DC VTVM, RCA Voltohmyst, or equiv.
AC VTVM, Ballantine Mod. #310A, or equiv.
Audio Oscillator, Hewlett-Packard Mod. 200C, or equiv.
Attenuator, 70 ohm, KAY Mod. 21-0, or equiv.

B. AMPLITUDE DISPLAY

Preliminary Settings:

Sona-Graph

ON-OFF switch - ON
SECTIONER - OFF
REC-REP switch - REP
REC - OFF- REP shift lever - OFF
LIN - LOG switch - LIN
NORMAL-INVERT switch - NORMAL

PLUG-IN-UNIT, 6076-A

S-1101 - AMPLITUDE DISPLAY
NORMAL -10 DB switch - NORMAL

1. Connect the DC voltmeter between ground and the junction of R1115 and R1121.
2. Adjust R1168 for a reading of +44 volts. Remove meter.
3. Connect the counter to R1101, pin 7.
4. Depress the BASELINE switch and adjust R1129 for a reading of 62 KC.
5. Connect the attenuator between the output of the audio oscillator and pin 19 of P1101.
6. Connect the AC VTVM to the reproduce output jack.
7. Switch in 12 DB of attenuation and adjust the output of the oscillator to obtain 85 mv.
8. Adjust R1122 to obtain 81.6 KC.
9. Insert 12 DB more attenuation and adjust R1157 to obtain 67.0 KC.
10. Take out 24 DB and adjust R1160 for a reading of 96.2 KC.
11. Output frequencies should track input levels as follows:

INPUT (DB)	OUTPUT (± 500 cps)
0	96.2 KC
-4	91.34 KC
-8	86.48 KC
-12 (85 mv) REF	81.6 KC
-16	76.76 KC
-20	71.90 KC
-24	67.0 KC

If necessary, repeat steps 7, 8, and 9 to obtain above readings, utilizing R1160 to split the error between 91.34 and 96.2 KC, and R1157 to split the error between 67.0 and 71.9 KC. 76.76 and 86.48 KC should track if the unit is properly aligned; do not readjust for these frequencies.

C. SCALE MAGNIFIER

Preliminary Settings:

Sona-Graph 6061-A

Same as for Amplitude Display alignment

6076-A Plug-In-Unit

S1101 - Scale Magnifier
R1158 - Fully CCW
R1161 - Slightly above fully CCW
R1146 - R1153 - Mid-range
UPPER LIMIT control - 8 KC
LOWER LIMIT control - 0 KC

1. Connect a counter to the CARRIER OSCILLATOR jack inside the 6061-A, and fasten the calibration chart (See Fig. 2-4) to the drum.

2. Set the Stylus at the bottom of the lead screw, and then raise it to a point where the SHORT POINT indicator just goes out.

3. Slide the calibration chart up or down on the drum until its lower Short Line is aligned with the stylus. Do not move the chart from this position for the remainder of this procedure.

4. Move the stylus up to the (0) line on the chart, and adjust R1153 for 200 KC on the counter.

5. Raise the stylus to the 2 KC chart-line, and adjust R1146 for a 224 KC reading.

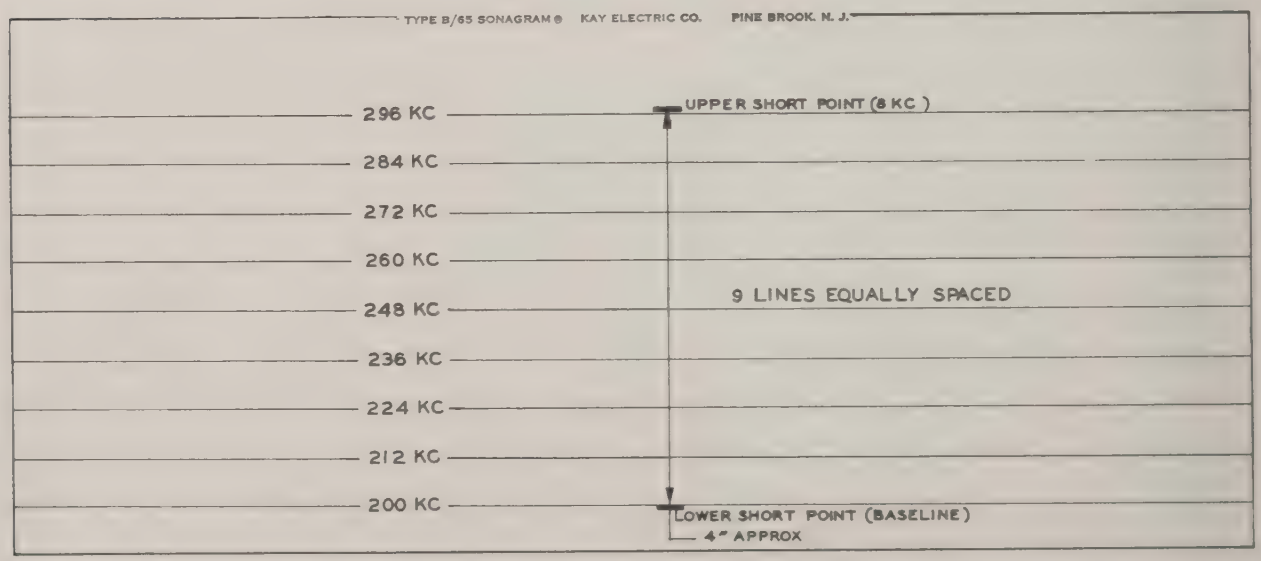


FIGURE 2.4 TYPICAL CALIBRATION CHART

6. Raise the stylus to the 4 KC chart-line, and adjust R1148 for a 248 KC reading.

7. Raise the stylus to the 6 KC chart-line, and adjust R1150 for a 272 KC reading.

8. Raise the stylus to the 8 KC chart-line, and adjust R1152 for a 296 KC reading.

9. Repeat the preceding steps, rechecking the frequency accuracy. Touch up the adjustments if necessary.

10. Align the stylus with the 8 KC chart-line.

11. Reverse the settings of the UPPER LIMIT and LOWER LIMIT controls, and adjust R1158 for 200 KC.

SECTION III
MAINTENANCE

3.1 VISUAL INSPECTION

The 6061-A and the 6076-A plug-ins should be visually inspected regularly, usually during periodic maintenance checks, for such things as loose or broken connections, cracked terminal strips, dirty recording head or surface, and faulty stylus adjustment. The recording surface especially should be cleaned regularly. Signs of overheating such as scorched wires or resistors, discolored casings or melted wax may indicate other less apparent troubles.

3.2 PARTS REPLACEMENT

Most components of this instrument are easily accessible and require no special replacement procedures. However, since some of the solid-state components used may be damaged when subjected to intense heat, avoid overheating when soldering the leads of these components. Longnose pliers may be used as a heat sink between the component and the tip of the soldering iron. The soldering iron should be hot before touching the solder joint, and removed immediately after the solder flows. The tip of the iron should be electrically at ground potential so that semiconductor components having low voltage ratings will not be damaged.

3.3 PARTS LOCATION

Due to the complexity of the Sona-Graph, the electrical system has been divided into seventeen separate systems to facilitate location and replacement of parts. These individual circuits are listed below and on Figures 3.1 and 3.2. Major components designations and printed circuit component designations are screened on the chassis or module.

	Component Designation	Circuit Location
A	1-99	Main Chassis
B	100-199	Record Module #1
C	200-299	Reproduce Module #2
D	300-399	Monitor & VU Module #3
E	400-499	Carrier Osc & Modulator Module #4
F	500-599	AGC & IF Module #5
G	600-699	Bias & Calib Module #6
H	700-799	Mark Amplifier Module #7
I	800-899	Sectioner Module #8
J	900-999	Power Supply
K	1000-1099	Filter Module
L	1100-1199	6076-A Plug-in
M	1200-1299	VU Meter
N	1300-1399	Low-Pass Filter
O	1400-1499	Record Pre-amplifier
P	1500-1599	Bias Adjust
Q	1600-1699	Reproduce Pre-amp
R	1700-1799	LOG-LIN Freq Adj.

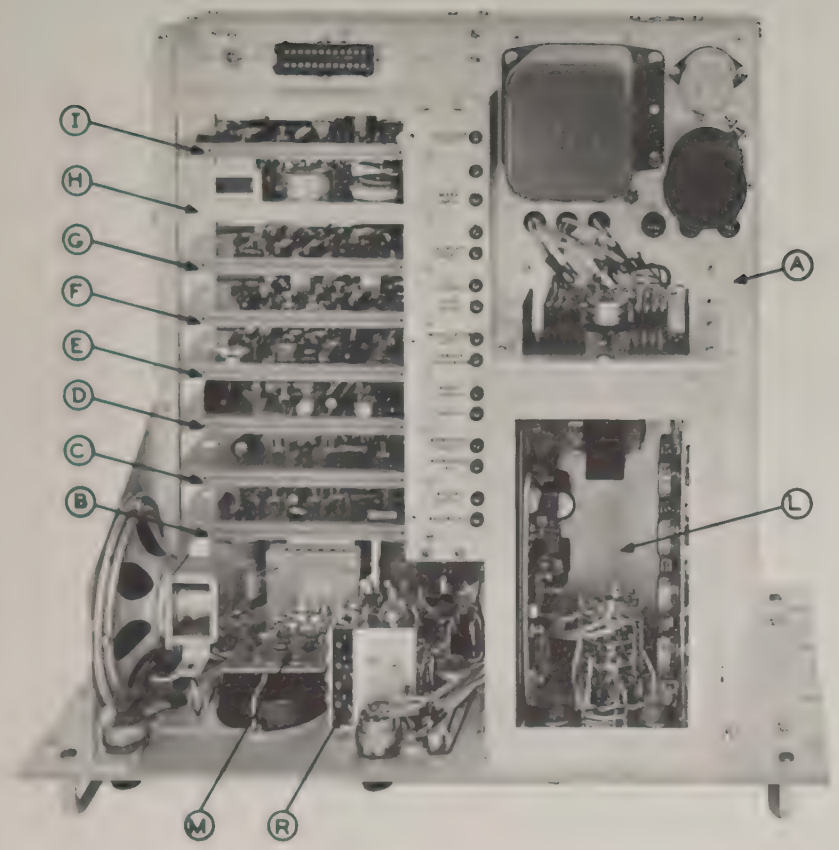


FIGURE 3.1 6061-A ELECTRICAL SYSTEM, TOP

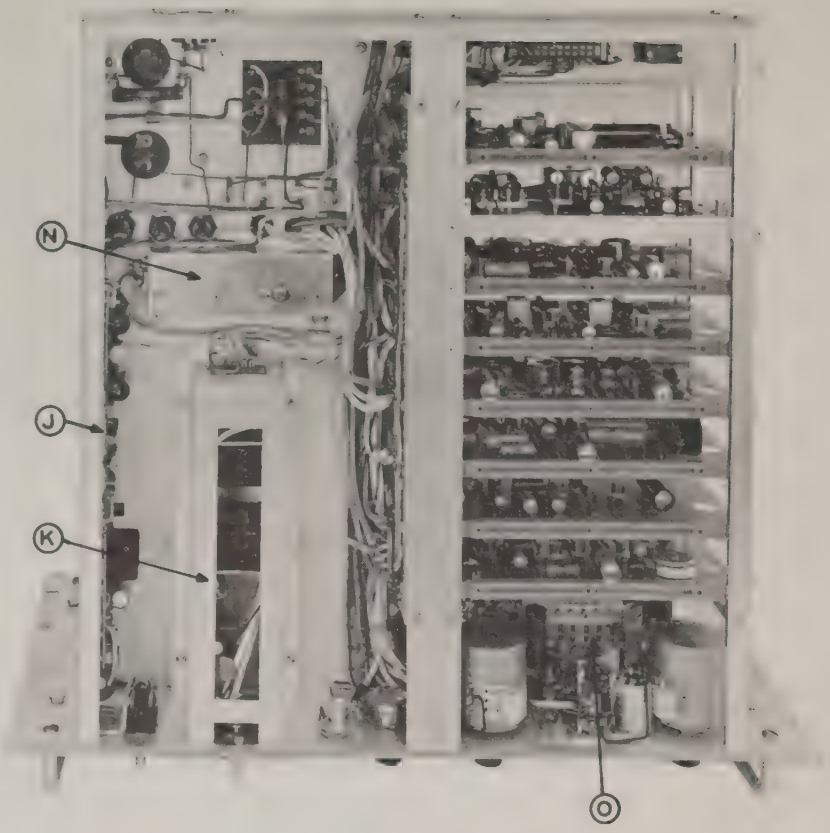


FIGURE 3.2 6061-A ELECTRICAL SYSTEM, BOTTOM

3.4 DISASSEMBLY OF THE MECHANICAL SYSTEM

The following procedures are included in this section to facilitate preventive maintenance programs, but should also prove helpful when troubleshooting the instrument.

3.4.1 REMOVAL OF MECHANICAL UNIT FROM CABINET

A. Remove rear grille and disconnect multi-conductor power cable and 3-conductor Mark Amplifier cable.

B. Remove (4) #4-40 screws and corner cover plate from top of unit.

C. Remove (6) #6-32 screws from top cover plates.

D. Remove (2) allen set screws from the Shift Lever knob and remove the knob. Remove the top cover plates.

E. Remove (8) #6-32 screws from the top of the mechanical system casting. The mechanical assembly is now free to remove from the cabinet.

F. Reverse procedure to reassemble mechanical system.

3.4.2 REMOVAL OF DRUM AND TURNTABLE

A. Loosen the Stylus Housing " Lock " nut and slide the housing away from the drum.

B. Loosen the Sectioner Plate lock nut and swing the Sectioner Plate away from the drum.

C. Remove the drum lock nut and Sectioner Micrometer Plate. Holding the turntable itself in a fixed position, slide the drum off over the turntable shaft.

D. To remove the turntable, hold the Record and Erase heads away from the recording surface and lift the turntable out of the main bearing.

> CAUTION: Allowing the heads to strike the turntable may throw the system out of line or may damage the heads and recording surface. When removing the turntable, maximum care should be exercised.

3.4.3 REMOVAL OF STYLUS HOUSING RESISTOR

A. Remove the (4) #4-40 screws holding the Stylus Housing cover. Remove cover.

B. Remove the (2) #6-32 screws from the record head side of the housing, freeing the Stylus Resistor assembly.

C. Loosen the stylus lock nut and provide slack in the cabling.

D. Ease the entire assembly out of its cavity.

3.5 CLEANING AND LUBRICATING THE MECHANICAL SYSTEM

Cleanliness and proper lubrication and adjustment of the mechanical system of the 6061-A is essential for obtaining clear, sharp, accurate information on the Sonagram pattern. The recording head and turntable surface especially should be cleaned periodically for optimum performance.

3.5.1 CLEANING THE RECORDING SYSTEM

The Record and Erase heads and turntable should be cleaned monthly during normal operation with a clean cloth dampened with carbon tetrachloride. Remove and clean the felt pad with carbon tet and apply a few drops of light machine oil before replacing.

3.5.2 CLEANING THE MARKING STYLUS ASSEMBLY

A wire-wound resistor, housed in the Stylus Assembly supplies the proper voltage changes to vary the carrier frequency and frequency range of the instrument. Should the resistor become dirty, random, dark horizontal streaks will appear on the pattern. The housing may be cleaned periodically by removing the cover plate and blowing out any accumulated dust with compressed air. The resistor itself may be removed as outlined in paragraph 3.4.3 and cleaned with a clean cloth dampened in carbon tetrachloride. Apply a very thin coat of petrolatum to surface of resistor. While reinstalling assembly, ascertain that contact is made between slider and resistor, and that the slider moves freely from top to bottom. The stylus wire itself, located in the neck of the Fume Exhaust Tube, should be readjusted periodically so that proper contact is made with the paper. The lead screw which drives the stylus holder should not be allowed to run dry. A light coat of petrolatum should be applied to the lead screw and the excess lubricant removed with a clean cloth. A drop or two of light oil should be applied to the bearings which support the lead screw whenever the lead screw itself is lubricated.

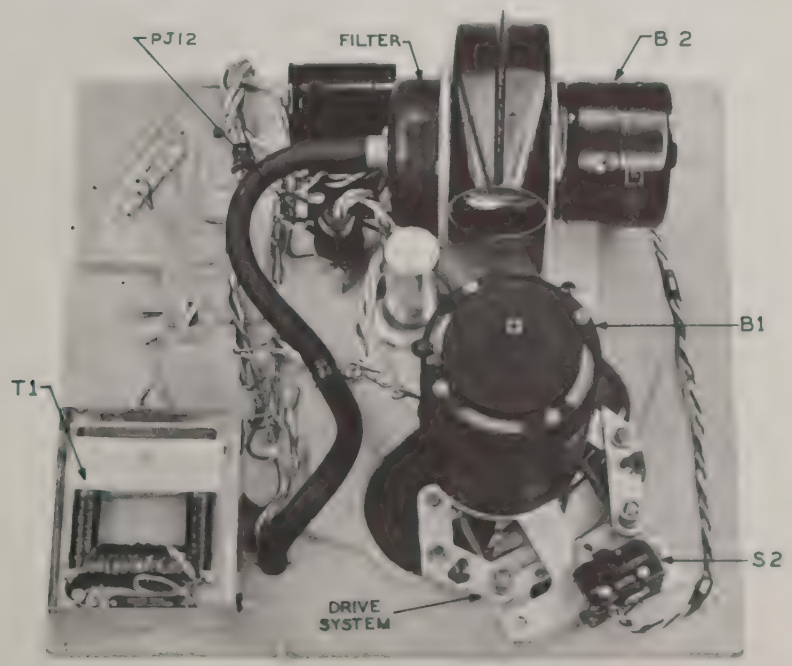


FIGURE 3.3 MECHANICAL SYSTEM, BOTTOM

3.5.3 EXHAUST SYSTEM

The Exhaust Tube itself should be cleaned as required to permit passage of air through the exhaust system. The blower motor on the underside of the mechanical system casting should be oiled every six months with light machine oil. If, with the blower operating, the fumes from the recording process are not drawn off through the exhaust hose, the filter may be clogged. This should be corrected by replacing the filter unit.

3.5.4 DRIVE SYSTEM MAINTENANCE

Remove the drum and turntable as indicated in paragraph 3.4.2. The drive wheels may now be cleaned with a clean cloth dampened in carbon tetrachloride or alcohol. The motor itself should be lubricated semi-annually with a light machine oil.

3.6 TROUBLESHOOTING DATA

This section contains information, voltage charts, and call-out photographs for use in servicing the Sona-Graph. To minimize unnecessary labor, try to use the alignment and preventive maintenance procedures before attempting any repairs. Certain abnormalities can be compensated for, using the proper adjustments.

To maintain the reliability of this instrument, always realign any portion that has been repaired. If the power supply circuits have been serviced, it is wise to perform the check-outs in Section V of the Operator's Manual if these checks reveal that functions are not within specifications, follow the appropriate portion of the alignment procedure.

UNIT IS BOTH ELECTRICALLY AND MECHANICALLY INOPERATIVE

If the pilot lamp is out and the mechanical system fails to operate, check fuses F901 and F902, the line cord, the POWER switch, and Plug-Jack 901 combination for continuity. Check also to see that the plug-in unit is firmly seated in its cavity.

UNIT IS MECHANICALLY INOPERATIVE, BUT ELECTRICALLY NORMAL

Check the continuity of PJ10-Pins 15 & 16, PJ12, and Motor Micro-switch, S2. If these checks fail to reveal an open circuit, check the continuity of the motor (B1) itself.

MECHANICAL SYSTEM IS NORMAL; NO SIGNAL CAN BE RECORDED

If the pilot lamp is out, check the continuity of the power transformer primary.

If the pilot lamp is on and the VU meter does not give any indication, check to see if the short point lamp is lit with the electrical in REPRODUCE mode and the stylus at the bottom of its travel. If the SHORT POINT indicator does not light, check Fuse F3 and the +18 volt supply circuit for proper DC levels. The levels should be similar to those given below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q4	18.0	18.9	31.0
Q901	19.4	20.0	31.0
Q902	6.5	7.0	20.0
Q903	18.9	19.4	31.0

If the above checks fail, check T901 secondary and diodes CR901 thru CR911.

If the SHORT POINT indicator lights, check the gain of the record amplifiers as follows:

Feed an audio signal of 2.5KC into the INPUT jack and adjust the oscillator for an output of 300mv peak-to-peak. With the RECORD LEVEL set to approx "20", connect a scope to pin 5 of PJ1. Gain voltages, similar to those found on schematic B7756 should be obtained. Approximate DC levels are given in the table below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q1401	2.8	3.4	10.0
Q101	9.5	10.0	12.1
Q102	3.3	4.0	8.9
Q103	2.6	3.4	10.4
Q104	3.5	4.2	9.2
Q105	2.7	2.7	12.0

If a meter indication and proper output at pin 2 of module #1 is obtained, check the continuity of Record Head PU-1. Check also to see that proper bias is obtained per the alignment procedure. The following DC levels are typical of the biasing circuits.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q604	0	-7	+15
Q605	0	-7	+15

UNIT FAILS TO ERASE PROPERLY

Check the DC levels as noted above and the continuity of Erase Head, PU-2.

PLAYBACK SIGNAL IS NOT PRESENT

If the system fails to mark the paper and the monitoring systems (VU meter and speaker) do not indicate normal signal strength, check the REPRODUCE PREAMPLIFIERS Q1601 and Q1602, the REPRODUCE AMPLIFIERS on module #2, and the continuity of the low pass filter. Refer to the table below for approximate DC levels.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q1601	1.7	2.3	9.5
Q1602	8.9	9.5	16.0
Q201	2.7	3.3	8.0
Q202	2.0	2.5	10.0
Q203	9.4	8.5	16.0

SYSTEM FAILS TO MARK PAPER: RECORD AND REPRODUCE FUNCTIONS ARE NORMAL

Check first the stylus wire itself to make sure it is making contact with the paper and the 3-conductor MARK AMPLIFIER cable to ascertain that it is properly connected to its jack on module #7.

If these checks fail to reveal the source of trouble, check the circuitry of the CARRIER OSCILLATOR AND MODULATOR Module #4 by connecting an oscilloscope to the CARRIER OSCILLATOR OUTPUT TJ-19. With the stylus slightly above the lower short point, the FREQ. SCALE switches in the LIN and NORMAL positions and accessory plug-in function switch in the OFF position, an output of approximately 25 volts peak-to-peak at 200KC should be obtained. Raise the stylus slowly and note a constant change in frequency. If the rate of change is abnormal, check the stylus resistor circuitry for continuity. If no output is obtained, check the characteristics of the oscillator and output stages of Module #4. Typical readings are given below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q401	8.5	7.8	14.6
Q402	2.5	2.5	16.5
Q403	17.4	17.9	18.0
Q404	3.1	3.0	17.9
Q405	3.3	3.9	7.8

If module #4 is operating satisfactorily, check the circuitry of MARK AMPLIFIER Module #7 and AGC-IF Module #5 as follows.

Record and reproduce a 2.5KC signal at "0" VU. Set the AGC control to "0" and the MARK LEVEL to "2". Connect an oscilloscope to FILTER OUT test jack, TJ-25. Raise the stylus to a point at which the 2.5KC signal peaks (with the mechanical system in reproduce) at approx. .55 volts peak-to-peak. If this reading is not obtained, check the DC levels of Q1001 thru Q1003 using the table below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q1001	1.5	2.1	8.1
Q1002	2.0	2.6	10.4
Q1003	9.6	10.4	18.0

If the FILTER OUTPUT is normal connect the scope to TJ-21 (IF OUTPUT), raise the stylus to the point at which the 2.5KC signal is obtained. If an output of approx. 4.9 volts is not noted on the scope, check the DC levels of Module #5.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q501-502	Conditions vary depending on AGC action involved		
Q503	1.4	1.9	10.7
Q504	4.7	5.3	16.5
Q505	1.9	2.5	5.3

If the IF output is normal, check the DC levels of MARK AMPLIFIER Module #7. Typical readings are given in the table below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q701	4.0	3.5	17.0
Q702-3	1.8	2.5	16.0
Q704-5	levels vary-B+ is unregulated		

SECTIONER FAILS TO FUNCTION

If the SECTIONER portion fails to operate normally, first check the Reed Switch Block to see that it is properly adjusted and that it closes as a Magnetic Pin passes it. This may be checked by connecting an ohmmeter across the terminals on the Reed Switch Block and rotating the drum by hand. Finally, check the continuity of CR801, CR802, and K801 and the DC levels of Module #8.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q801	2.4	3.0	8.0
Q802	7.5	8.0	16.0
Q803	2.0	2.6	16.0
Q804	-1.0	-.2	0
Q805	-1.0	-.5	-1.5
Q806	1.3	-1.6	17.0
Q807	1.3	1.8	+1.4

MONITOR SYSTEM FAILS TO FUNCTION

If the SONA-GRAPH is working normally but the VU and speaker systems fail to operate, check the circuitry of Module #3. Typical DC levels are included in the table below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q301	8.6	9.8	18.0
Q302	2.3	2.9	9.0
Q303	2.0	2.5	10.0
Q304	10.0	10.0	18.0
Q305	2.4	2.8	17.5

SYSTEM RECORDS NORMALLY; CALIBRATION MARKS ARE NOT GENERATED

If, with the entire system functioning normally, calibration marks cannot be generated, check the continuity of CR601 and the DC levels given below.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q601	0	.04	16.5
Q602	9.2	7.6	15
Q603	3.6	4.2	7.6

FREQUENCY VARIATIONS NOTED IN CALIBRATION LINES

The Mechanical Shift Lever should be left in the OFF (neutral) position when the SONAGRAPH is not in use to prevent a flat from developing on the rubber drive wheel, which may appear as excessive "wow" on the Sonagram. Drive adjustments are provided on the mechanical system to compensate for most speed variations. The top covers may be removed as outlined in paragraph 3.4.1. Place the Mechanical Shift Lever in the Record position where most of the "wow" originates. Loosen the #6-32 allen set screw located on the top of the grommet surrounding the Shift Lever (see Fig. 3.4). Record and "capture" a 6KC (approx.) signal. Adjust the MONITOR LEVEL for a convenient volume and, leaving the Shift Lever in the RECORD position, adjust the record drive set screw in small increments until a more constant tone is being played back. After each adjustment the signal should be re-recorded until optimum setting is obtained. Turning the set screw in a clockwise direction decreases pressure on the drive wheels. When a satisfactory tone is being played back, place the Shift Lever in the REPROD position, raise the stylus to the point at which the 6KC tone causes the neon RF indicator to glow, and decrease the MARK LEVEL until a very small RF signal is present at the stylus. Mark the paper and note that the line waver is decreased to 1/16" peak-to-peak variation. Retighten the drive "lock" set screw. If above procedure does not compensate for "wow" it may be necessary to clean or replace the drive wheels as outlined in paragraph 3.5.4.

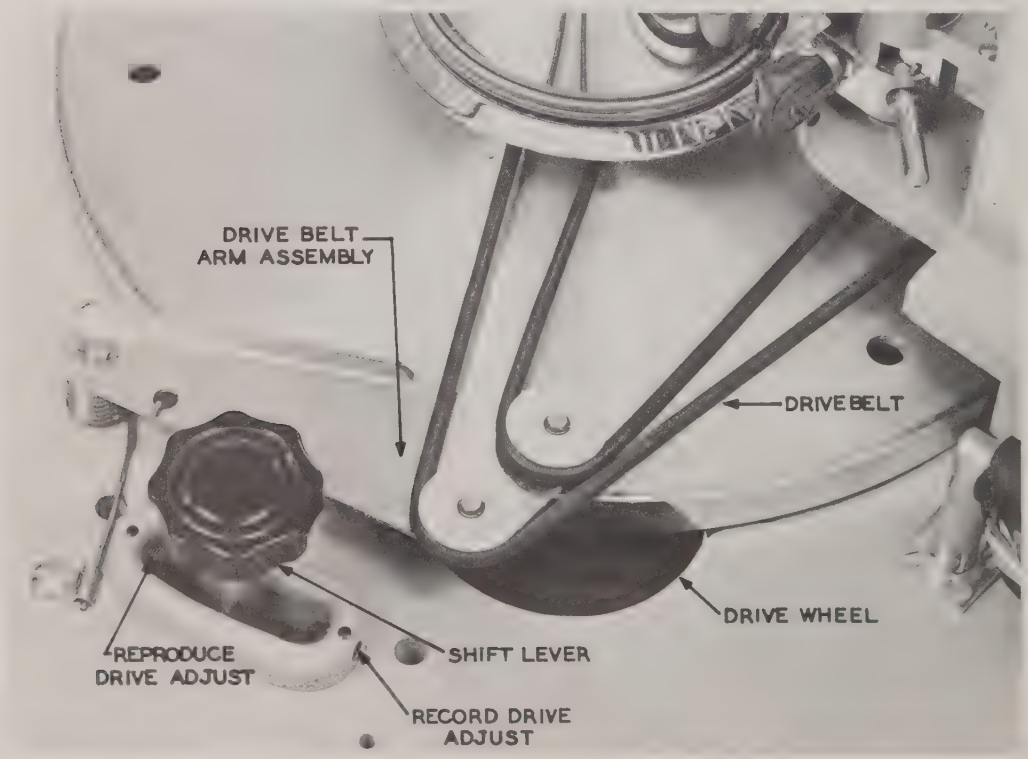


FIGURE 3.4 MECHANICAL DRIVE SYSTEM

3.7 RESHIPMENT INSTRUCTIONS

Permission to return equipment should be obtained from the factory or an accredited Kay representative before return shipment is made. If it is necessary to return the 6061-A or 6076-A for repair, pad it securely for transit. A packing slip should be included in the carton furnishing identification of the shipper, as well as the instrument type and serial number. Also, include a statement indicating the malfunction for the benefit of service personnel.

3.8 PARTS LISTS, 6061-A & 6076-A

To insure satisfactory performance, use only exact replacement parts when making repairs. These are available from the Kay Electric Company. Please make reference to the instrument type, serial number, drawing symbol number, and Kay part number when ordering.

Due to recent progress in the field of transistors, your particular instrument may not include semiconductors as specified on the schematic drawings or in the parts listing. The TI494, TI495, 2N2716, and 2N3391 transistors used in earlier units have been replaced by either type 2N3565 or 2N3859. Type 2N1511 has been replaced by a 2N3055. The characteristics of these semiconductors are similar and no further circuit changes are necessary. Other components in the Sona-Graph may also be found to be of different type or manufacturer than specified. These have been changed due to design modifications and will make satisfactory replacement parts for earlier models.

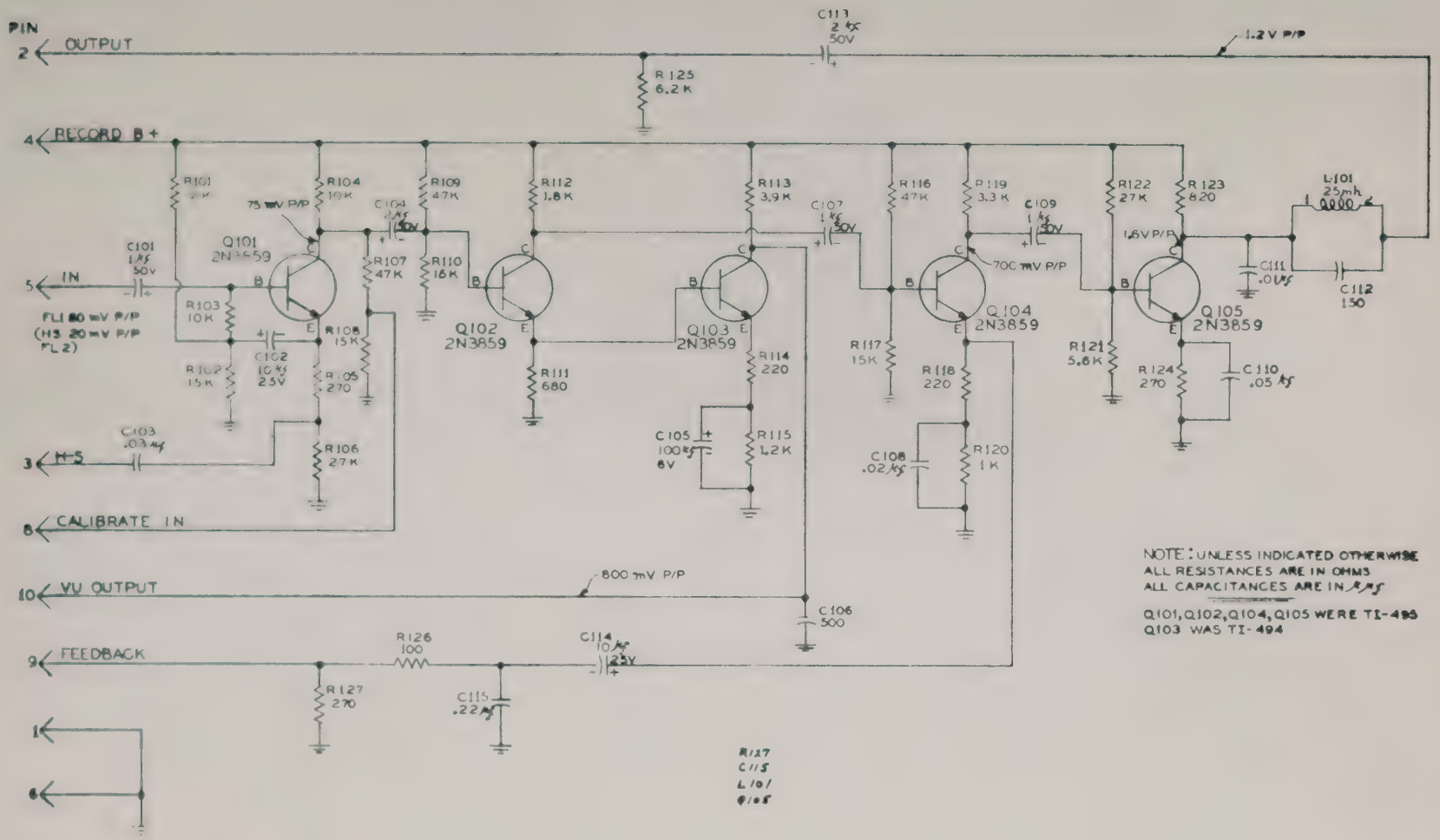
PARTS LIST, RECORD AMP. MODULE #1

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
	Entire Pretested Record Ampl. Module	7756W	
CAPACITORS:			
C101	1μf, 50V., Electrolytic	6355-107	Sprague Type 40D
C102	10μf, 15V., "	6355-108	Siemens Type T11
C103	.03μf, 100V., Mylar-paper	6899-22	Elmenco 1DP-1-303
C104	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C105	100μf, 6V., "	6355-109	Sprague 40D107F006DDO
C106	500 μμf, 500V., silver mica	6359-66	Elmenco DM15-501
C107	1μf, 50V., Electrolytic	6355-107	Sprague Type 40D
C108	.02μf, 100V., Mylar-paper	6899-13	Elmenco 1DP-1-203
C109	1μf, 50V., Electrolytic	6355-107	Sprague Type 40D
C110	.05μf, 100V., Mylar-paper	6899-1	Elmenco 1DP-2-503
C111	.01μf, 100V., Mylar-paper	6899-12	Elmenco 1DP-1-103
C112	150μμf, 500V., silver mica	6359-62	Elmenco DM15-151
C113	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C114	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier NLW 10-25
C115	.22μf, 50V., Mylar	6411-1	Goodall 601PE
COILS:			
L101	Coil, 25 MH	8579	Kay Electric Co.
TRANSISTORS:			
Q101	Transistor, 2N3859	K172	General Electric 2N3859
Q102	" "	"	" "
Q103	" "	"	" "
Q104	" "	"	" "
Q105	" "	"	" "

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½ watt, 10% tolerance)			
R101	12K	1231-E	Allen Bradley EB1231
R102	15K	1531-E	" " EB1531
R103	10K	1031-E	" " EB1031
R104	10K	1031-E	" " EB1031
R105	270	2711-E	" " EB2711
R106	27K	2731-E	" " EB2731
R107	47K	4731-E	" " EB4731
R108	15K	1531-E	" " EB1531
R109	47K	4731-E	" " EB4731
R110	15K	1531-E	" " EB1531
R111	680	6811-E	" " EB6811
R112	1.8K	1821-E	" " EB1821
R113	3.9K	3921-E	" " EB3921
R114	220	2211-E	" " EB2211
R115	1.2K	1221-E	" " EB1221
R116	47K	4731-E	" " EB4731
R117	15K	1531-E	" " EB1531
R118	220	2211-E	" " EB2211
R119	3.3K	3321-E	" " EB3321
R120	1K	1021-E	" " EB1021
R121	5.6K	5621-E	" " EB5621
R122	27K	2731-E	" " EB2731
R123	820	8211-E	" " EB8211
R124	270	2711-E	" " EB2711
R125	6.2K, 5% tol.	6225-E	" " EB6225
R126	100	1011-E	" " EB1011
R127	270	2711-E	" " EB2711

PARTS LIST, REPRODUCE AMP, MODULE #2

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
	Entire Pretested Reproduce Ampl. Module	7757W	
CAPACITORS:			
C201	1μf, 50V., Electrolytic	6355-107	Sprague Type 40D
C202	10μf, 25V., "	6355-106	Cornell Dubilier NLW 10-25
C203	2μf, 50V., "	6355-87	Sprague 40D205F050CB3
C204	" " "	"	" " "
C205	.01μf, 400V., Mylar-paper	6899-8	Elmenco 4DP-1-103
C206	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier NLW 10-25
C207	250μf, 25V., Electrolytic	6355-47	Cornell Dubilier BR 250-25
TRANSISTORS:			
Q201	Transistor, 2N3859	K-172	General Electric 2N3859
Q202	Transistor, 2N3859	K-172	General Electric 2N3859
Q203	Transistor, 2N3859	K-172	General Electric 2N3859
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½ watt, 10% tolerance)			
R201	270	2711-E	Allen Bradley EB2711
R202	39K	3931-E	" " EB3931
R203	10K	1031-E	" " EB1031
R204	10K	1031-E	" " EB1031
R205	8.2K	8221-E	" " EB8221
R206	220	2211-E	" " EB2211
R207	2.2K	2221-E	" " EB2221
R208	120K	1241-E	" " EB1241
R209	27K	2731-E	" " EB2731
R210	8.2K	8221-E	" " EB8221
R211	2.2K	2221-E	" " EB2221
R212	51K, 5% tol.	5135-E	" " EB5135
R213	2.2K	2221-E	" " EB2221



NOTE: UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE IN µf

Q101, Q102, Q104, Q105 WERE TI-495
Q103 WAS TI-494

FIGURE 3.5 SCHEMATIC, MODULE #1, B7756C

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
R214	2.2K	2221-E	Allen Bradley EB2221
R215	820	8211-E	" " EB8211

PARTS LIST, MONITOR & VU AMP. MODULE #3

CAPACITORS:

C301	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier NLW 10-25
C302	" " "	"	" " "
C303	100μf, 6V., "	6355-26	Argonne
C304	2μf, 50V., "	6355-87	Sprague 40D205F050CB3
C305	100μf, 6V., "	6355-26	Argonne
C306	10μf, 25V., "	6355-106	Cornell Dubilier NLW 10-25
C307	100μμf, 500V., silver mica	6359-46	Elmenco DM15-101
C308	250μf, 25V., Electrolytic	6355-47	Cornell Dubilier BR250-25
C309	100μf, 15V., Electrolytic	6355-110	" " NLW 100-15

DIODES:

CR301	Diode, Germanium, IN294	6357-18	Erie 1801ED IN294
CR302	" " "	"	" " "

TRANSISTORS:

Q301	Transistor, 2N3859	K172	General Electric 2N3859
Q302	" "	"	" " "
Q303	" "	"	" " "
Q304	" GE7A32	K147	General Electric 4JD7A32
Q305	" 2N2339	K146	RCA 2N2339

RESISTORS: (Unless otherwise specified, all components are fixed composition, ½ watt, 10% Tolerance)

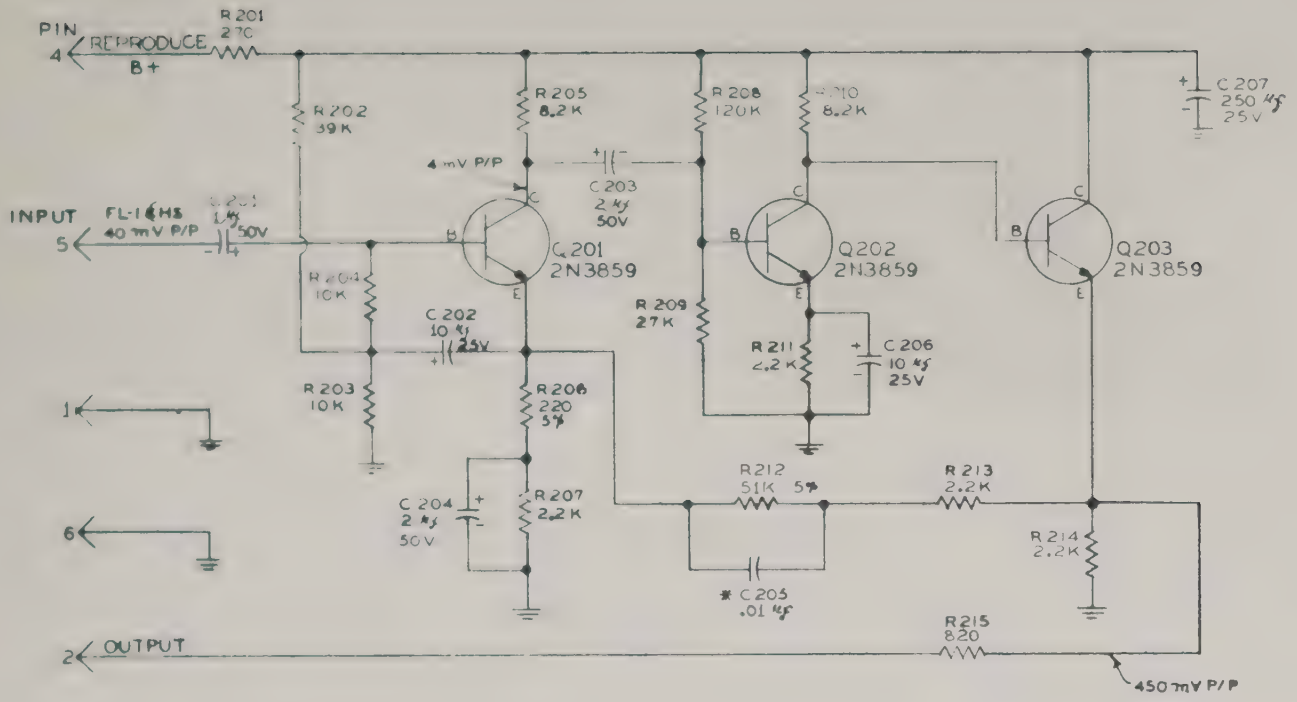
R301	5.6K	5621-E	Allen Bradley EB5621
R302	10K, ½ watt pot, wire wound	9122-85	Bourns 3067P-1-103
R303	5K, ½ watt pot, wire wound	9122-83	Bourns 3067P-1-502
R304	8.2K	8221-E	Allen Bradley EB8221
R305	39K	3931-E	" " EB3931
R306	8.2K	8221-E	" " EB8221
R307	6.8K	6821-E	" " EB6821
R308	180	1811-E	" " EB1811
R309	1.5K	1521-E	" " EB1521
R310	330	3311-E	" " EB3311
R311	100K	1041-E	" " EB1041
R312	22K	2231-E	" " EB2231
R313	4.7K	4721-E	" " EB4721
R314	220	2211-E	" " EB2211
R315	1K	1021-E	" " EB1021
R316	680	6811-E	" " EB6811
R317	1.8K	1821-E	" " EB1821
R318	470	4711-E	" " EB4711
R319	22, 2 watt	2201-H	" " HB2201
R320	2.2K	2221-E	" " EB2221

PARTS LIST, CARRIER OSC. & MOD. MODULE # 4

	Entire Pretested Carrier Osc. and Mod. Module	7756W

CAPACITORS:

C401	50μf, 25V., Electrolytic	6355-113	Sprague Type 40D
C402	25μf, 25V., "	6355-111	" TE1207
C403	.001μf, 500V., Ceramic Disc	6360-2	" 19CIA
C404	Not Used		
C405	.05μf, 100V., paper-mylar	6899-1	Elmenco 1DP-2-503
C406	.22μf, 50V., mylar	6411-1	Goodall 601-PE
C407	" " "	"	" "
C408	.05μf, 100V., paper-mylar	6899-1	Elmenco 1DP-2-503
C409	" " " "	"	" "
C410	" " " "	"	" "
C411	.01μf, 500V., Ceramic Disc	6360-6	Sprague 36C1



NOTE: UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE IN µf
* FACTORY SELECT

Q 201 WAS TI-495
Q 202, Q 203, WERE TI-494

R 215
C 207
Q 203

FIGURE 3.6 SCHEMATIC, MODULE #2, B7757D

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
C412	1μf, 50V., Electrolytic	6355-107	Sprague Type 40D
C413	22μf, 15V., Electrolytic	6355-84	SCM-2
C414	Not Used		
C415	.02μf, 500V., Ceramic Disc	6360-7	Sprague 44C2
C416	IN953, Varactor	6357-97	Hughes IN953
C417	" "	"	" "
DIODES:			
CR401	Diode, silicon, IN3067		
CR402	" " "		
CR403	" " "		
CR404	" " "		
CR405	Not Used		
CR406	Not Used		
CR407	IN3024A	6357-67	Motorola IM15Z10
LAMP:			
I401	Lamp, #1787	249-1787	General Electric 1787
TRANSISTORS:			
Q401	Transistor, 2N3859	K172	General Electric 2N3859
Q402	" GE7A32	K147	General Electric 4JD7A32
Q403	" "	"	" " "
Q404	" 2N3859	K172	General Electric 2N3859
Q405	" "	"	" " "
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance)			
R401	270	2711-E	Allen Bradley EB2711
R402	100	1011-E	" " EB1011
R403	22K	2231-E	" " EB2231
R404	1.5K	1521-E	" " EB1521
R405	22K	2231-E	Allen Bradley EB2231
R406	1K	1021-E	" " EB1021
R407	2K, ½watt pot, variable	9122-80	Bourns 3067P-1-202
R408	1K	1021-E	Allen Bradley EB1021
R409	1K	1021-E	" " EB1021
R410	390	3911-E	" " EB3911
R411	8.2K	8221-E	" " EB8221
R412	1.8K	1821-E	" " EB1821
R413	560	5611-E	" " EB5611
R414	931, ¼watt, 1% tol.	6558-50	Mepco Type C10
R415	500, ½watt pot, variable	9122-87	Bourns 275-1-501
R416	3.9K	3921-E	Allen Bradley EB3921
R417	2.2K	2221-E	" " EB2221
R418	82K	8231-E	" " EB8231
R419	33K	3331-E	" " EB3331
R420	467, ¼watt, 1% tol.	6558-45	Mepco Type C10
R421	3.9K	3921-E	Allen Bradley EB3921
R422	27K	2731-E	" " EB2731
R423	100	1011-E	" " EB1011
R424	22K	2231-E	" " EB2231
R425	8.2K	8221-E	" " EB8221
R426	120K	1241-E	" " EB1241
R427	6.191K, ¼watt, 1% tol.	6558-251	Mepco Type EP25
R428	33K	3331-E	Allen Bradley EB3331
R429	6.191K, ¼watt, 1% tol.	6558-251	Mepco Type EP12
R430	4.7K	4721-E	Allen Bradley EB4721
TRANSFORMERS:			
T401	Transformer, special	T401/7759G	Kay Electric Co.
T402	" "	T402/7759G	Kay Electric Co.

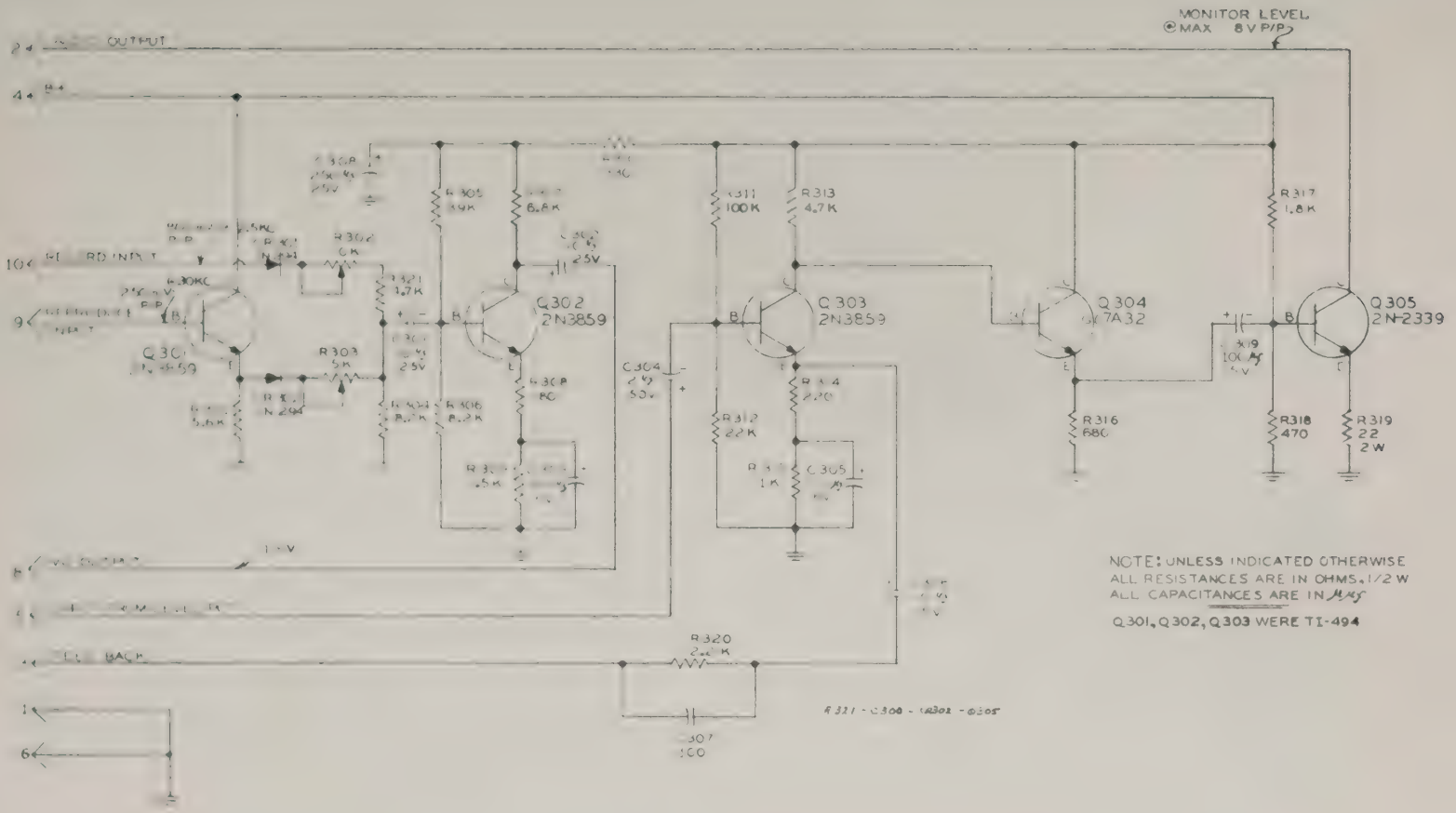


FIGURE 3.7 SCHEMATIC, MODULE #3, B7758D

PARTS LIST, AGC & IF AMP. MODULE #5

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
	Entire Pretested AGC & IF Module	7760W	
CAPACITORS:			
C501	.01μf, 100V., paper-mylar	6899-12	Elmenco 1DP-1-103
C502	.005μf, 100V., paper-mylar	6899-14	Elmenco 1DP-1-502
C503	470μμf, 500V., silver mica	6359-79	Elmenco DM16-471
C504	2μf, 50V., Electrolytic	6355-87	Sprague Type 40D
C505	.005μf, 100V., paper-mylar	6899-14	Elmenco 1DP-1-502
C506	.001μf, 600V., paper-mylar	6899-10	Elmenco 6DP-1-102
C507	2μf, 50V., Electrolytic	6355-87	Sprague Type 40D
C508	.01μf, 100V., paper-mylar	6899-12	Elmenco 1DP-1-103
C509	.01μf, 100V., paper-mylar	6899-12	Elmenco 1DP-1-103
C510	2μf, 50V., Electrolytic	6355-87	Sprague 40D
C511	82μμf, 500V., silver mica	6359-72	Elmenco DM15-820
C512	.01μf, 100V., paper-mylar	6899-12	Elmenco 1DP-1-103
C513	.02μf, 100V., paper-mylar	6899-13	Elmenco 1DP-1-203
C514	.02μf, 100V., paper-mylar	6899-13	Elmenco 1DP-1-203
DIODES:			
CR501	Diode, Germanium 1N100	6357-76	Erie 1N100
CR502	Diode, Germanium 1N100	6357-76	Erie 1N100
CR503	Diode, Germanium 1N100	6357-76	Erie 1N100
TRANSISTORS:			
Q501	Transistor, 2N3859	K172	General Electric 2N3859
Q502	Transistor, 2N3859	K172	General Electric 2N3859
Q503	Transistor, GE7A32	K147	General Electric 4JD7A32
Q504	Transistor, 2N3859	K172	General Electric 2N3859
Q505	Transistor, 2N3859	K172	General Electric 2N3859
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)			
R501	120K	1241-E	Allen Bradley EB1241
R502	12K	1231-E	Allen Bradley EB1231
R503	10K, ½w, pot, variable	9122-85	Bourns 3067P-1-103
R504	15K	1531-E	Allen Bradley EB1531
R505	6.8K	6821-E	Allen Bradley EB6821
R506	1K	1021-E	Allen Bradley EB1021
R507	8.2K	8221-E	Allen Bradley EB8221
R508	270	2711-E	Allen Bradley EB2711
R509	500, ½watt, pot, variable	9122-84	Bourns 3067P-1-501
R510	120	1211-E	Allen Bradley EB1211
R511	120K	1241-E	Allen Bradley EB1241
R512	8.2K	8221-E	Allen Bradley EB8221
R513	1K	1021-E	Allen Bradley EB1021
R514	8.2K	8221-E	Allen Bradley EB8221
R515	470	4711-E	Allen Bradley EB4711
R516	15K	1531-E	Allen Bradley EB1531
R517	3.3K	3321-E	Allen Bradley EB3321
R518	180	1811-E	Allen Bradley EB1811
R519	680	6811-E	Allen Bradley EB6811
R520	120	1211-E	Allen Bradley EB1211
R521	62K, 5% tol.	6235-E	Allen Bradley EB6235
R522	12K	1231-E	Allen Bradley EB1231
R523	6.8K	6821-E	Allen Bradley EB6821
R524	5K, ½watt, pot, variable	9122-83	Bourns 3067P-1-502
R525	2K, 5% tol.	2025-E	Allen Bradley EB2025
R526	1.2K	1221-E	Allen Bradley EB1221
R527	3.9K	3921-E	Allen Bradley EB3921
R528	270	2711-E	Allen Bradley EB2711
TRANSFORMERS:			
T501	Transformer, IF	8571	Kay Electric Co.
T502	Transformer, IF	8571	Kay Electric Co.

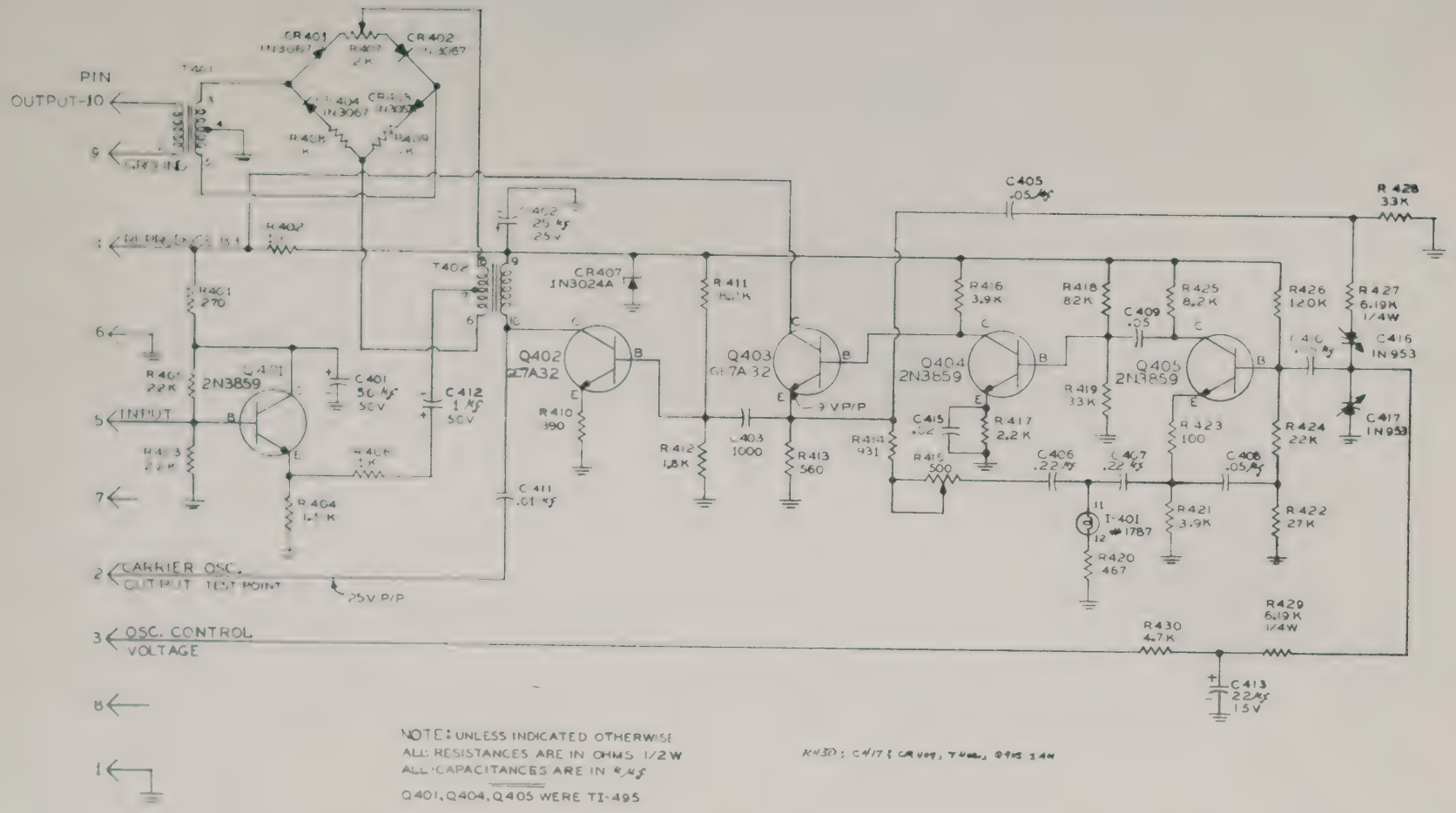


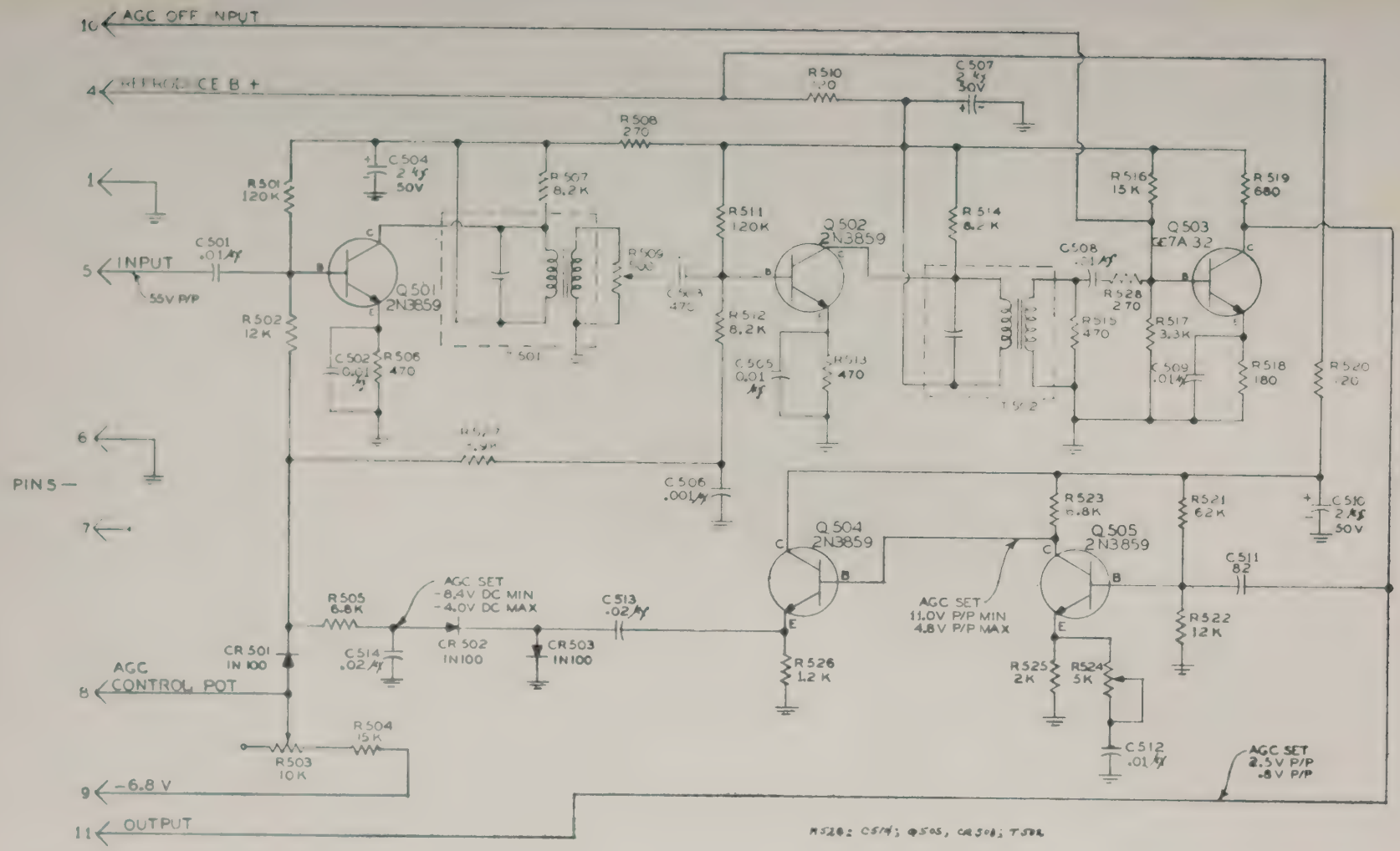
FIGURE 3.8 SCHEMATIC, MODULE #4, B7759H

PARTS LIST, BIAS & CALIBRATE OSC. MODULE #6

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
	Entire Pretested Bias & Calibrate Module	7761W	
CAPACITORS:			
C601	.05μf, 100V., mylar-paper	6899-1	Elmenco 1DP-2-503
C602	.002μf, 600V., mylar-paper	6899-4	Elmenco 6DP-1-202
C603	25μf, 25V., Electrolytic	6355-111	Sprague TE1207
C604	10μf, 15V., Electrolytic	6355-108	Siemens Type T11
C605	.05μf, 100V., mylar-paper	6899-1	Elmenco 1DP-2-503
C606	.05μf, 100V., mylar-paper	6899-1	Elmenco 1DP-2-503
C607	.05μf, 100V., mylar-paper	6899-1	Elmenco 1DP-2-503
C608	.05μf, 100V., mylar-paper	6899-1	Elmenco 1DP-2-503
C609	25μf, 25V., Electrolytic	6355-111	Sprague TE1207
C610	.02μf, 100V., mylar-paper	6899-13	Elmenco 1DP-1-203
C611	.02μf, 100V., mylar-paper	6899-13	Elmenco 1DP-1-203
C612	25μf, 25V., Electrolytic	6355-111	Sprague TE1207
C613	Factory selected	-	- -
DIODES:			
CR601	Diode, silicon, IN3067	6357-74	Fairchild IN3067
TRANSISTORS:			
Q601	Transistor, 2N3859	K172	General Electric 2N3859
Q602	Transistor, 2N3859	K172	General Electric 2N3859
Q603	Transistor, 2N3565	K173	Fairchild 2N3565
Q604	Transistor, GE7B2	K148	General Electric 4JD7B2
Q605	Transistor, GE7B2	K148	General Electric 4JD7B2
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)			
R601	10K	1031-E	Allen Bradley EB1031
R602	Not used	-	- -
R603	270	2711-E	Allen Bradley EB2711
R604	10K	1031-E	Allen Bradley EB1031
R605	680	6811-E	Allen Bradley EB6811
R606	4.7K	4721-E	Allen Bradley EB4721
R607	5K, ½watt pot, wire wound	9122-83	Bourns 3067P-1-502
R608	47K	4731-E	Allen Bradley EB4731
R609	10K	1031-E	Allen Bradley EB1031
R610	220	2211-E	Allen Bradley EB2211
R611	4.7K	4721-E	Allen Bradley EB4721
R612	1K	1021-E	Allen Bradley EB1021
R613	2.2K	2221-E	Allen Bradley EB2221
R614	22K	2231-E	Allen Bradley EB2231
R615	7.5K, 5% tol.	7527-E	Allen Bradley EB7527
R616	5.6K	5621-E	Allen Bradley EB5621
R617	2443, 1% tol.	6558-249	IRC Type CEC-T-O
R618	10K, ½watt pot, wire wound	9122-85	Bourns 3067P-1-103
R619	10K, 1% tol.	6558-250	IRC Type CEC-T-O
R620	7.5, 2 watt, ± 5% tol.	9292-10	Corning Type C42
R621	1.8K	1821-E	Allen Bradley EB1821
R622	1.8K	1821-E	Allen Bradley EB1821
TRANSFORMERS:			
T601	Transformer, special	T601/7761A	Kay Electric Co.

PARTS LIST, MARK AMPLIFIER MODULE #7

	Entire Pretested Mark Ampl. Module	7762W	
CAPACITORS:			
C701	.01μf, 500V., ceramic disc	6360-6	Sprague 36CI



NOTE: UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS 1/2W
ALL CAPACITANCES ARE IN µµf
* FACTORY SELECT

C501, Q502, Q505 WERE T1495
Q504 WAS T1494

FIGURE 3.9 SCHEMATIC, MODULE #5, B7760E

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
C702	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier NLW 10-25
C703	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier NLW 10-25
C704	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier NLW 10-25
C705	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C706	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C707	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C708	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C709	.2μf, 75V., ceramic disc	6360-9	Gulton K8000V, .2K
C710	25μf, 50V., Electrolytic	6355-119	Sprague 6513-C
COILS:			
L701	Coil, special, toroidal	L701/7762C	Kay Electric Co.
L702	Coil, choke, 100uh	6394-25	Millen Mfg. 34300
CONNECTORS:			
J702	Jack, 3-terminal	217	Cinch Jones S-303AB
P701	Plug, 15-terminal	6909-20	Amphenol 133-015-21
TRANSISTORS:			
Q701	Transistor, 2N3859	K172	General Electric 2N3859
Q702	Transistor, GE7A32	K147	General Electric 4JD7A32
Q703	Transistor, GE7A32	K147	General Electric 4JD7A32
Q704	Transistor, 2N1907	K145	Texas 2N1907
Q705	Transistor, 2N1907	K145	Texas 2N1907
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)			
R701	10K	1031-E	Allen Bradley EB1031
R702	27K	2731-E	Allen Bradley EB2731
R703	560	5611-E	Allen Bradley EB5611
R704	220	2211-E	Allen Bradley EB2211
R705	470	4711-E	Allen Bradley EB4711
R706	1.8K	1821-E	Allen Bradley EB1821
R707	18	1801-E	Allen Bradley EB1801
R708	51, 5% tol.	5105-E	Allen Bradley EB5105
R709	51, 5% tol.	5105-E	Allen Bradley EB5105
R710	.82, 1 watt, 5% tol.	P825-G	IRC Type BWH
R711	.82, 1 watt, 5% tol.	P825-G	IRC Type BWH
R712	120	1211-E	Allen Bradley EB1211
R713	120	1211-E	Allen Bradley EB1211
R714	5.6K	5621-E	Allen Bradley EB5621
TRANSFORMERS:			
T701	Transformer, special	T701/7762B	Kay Electric Co.
T702	Transformer, special	T702/7762B	Kay Electric Co.
PARTS LIST, SECTIONER-MODULE #8			
	Entire Pretested Sectioner Module	7763W	
CAPACITORS:			
C801	.01μf, 400V., mylar-paper	6899-8	Elmenco 4DP-3-104
C802	.01μf, 400V., mylar-paper	6899-8	Elmenco 4DP-3-104
C803	.1μf, 100V., mylar-paper	6899-11	Elmenco 1DP-2-104
C804	.001μf, 600V., mylar-paper	6899-10	Elmenco 6DP-1-102
C805	.22μf, 50V., mylar-paper	6411-1	Goodall 601PE
C806	10μf, 25V., Electrolytic	6355-106	Cornell Dubilier Type NLW
C807	.22μf, 50V., mylar-paper	6411-1	Goodall 601PE
C808	150μf, 25V., Electrolytic	6355-45	Int'l Elect. APD116
C809	39μμf, 500V., silver mica	6359-59	Elmenco DM15-390
C810	39μμf, 500V., silver mica	6359-59	Elmenco DM15-390
C811	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3

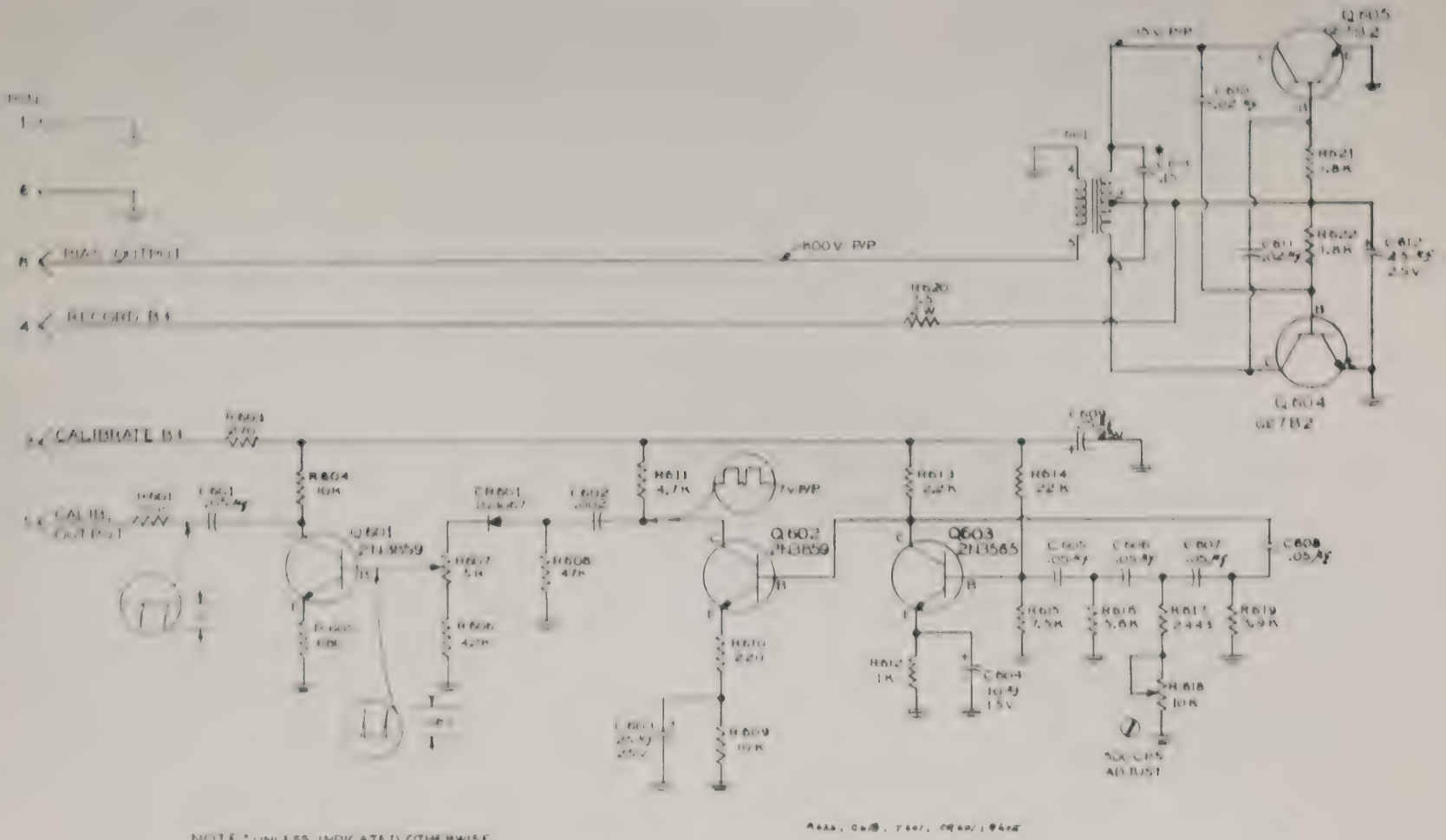


FIGURE 3.10 SCHEMATIC, MODULE #6, B7761D

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
DIODES:			
CR801	Diode, Germanium, IN100	6357-76	Raytheon IN100
CR802	Diode, Germanium, IN100	6357-76	Raytheon IN100
CR803	Diode, Silicon, F6	6357-3	Sarkes Tarzian F6
CR804	Diode, Silicon, HS-9	6357-87	Hoffman HS-9 207-6203
RELAY:			
K801	Relay, Mercury	9171	Adams & Westlake Co. MWSA-16 121
TRANSISTORS:			
Q801	Transistor, 2N3859	K172	General Electric 2N3859
Q802	Transistor, 2N3859	K172	General Electric 2N3859
Q803	Transistor, GE7A32	K147	General Electric 4JD7A32
Q804	Transistor, 2N3859	K172	General Electric 2N3859
Q805	Transistor, 2N3859	K172	General Electric 2N3859
Q806	Transistor, 2N3859	K172	General Electric 2N3859
Q807	Transistor, 2N3859	K172	General Electric 2N3859
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½ watt, 10% tolerance.)			
R801	8.2K	8221-E	Allen Bradley EB8221
R802	33K	3331-E	Allen Bradley EB3331
R803	4.7K	4721-E	Allen Bradley EB4721
R804	470	4711-E	Allen Bradley EB4711
R805	1K	1021-E	Allen Bradley EB1021
R806	680	6811-E	Allen Bradley EB6811
R807	470	4711-E	Allen Bradley EB4711
R808	2.2K	2221-E	Allen Bradley EB2221
R809	22	2201-E	Allen Bradley EB2201
R810	3.9K	3921-E	Allen Bradley EB3921
R811	22	2201-E	Allen Bradley EB2201
R812	5K, ½watt pot, wire wound	9122-83	Bourns 3067P-1-502
R813	18K	1831-E	Allen Bradley EB1831
R814	18	1801-E	Allen Bradley EB1801
R815	100K	1041-E	Allen Bradley EB1041
R816	120K	1241-E	Allen Bradley EB1241
R817	1.8K	1821-E	Allen Bradley EB1821
R818	6.8K	6821-E	Allen Bradley EB6821
R819	120K	1241-E	Allen Bradley EB1241
R820	220	2211-E	Allen Bradley EB2211
R821	560	5611-E	Allen Bradley EB5611
R822	6.2K, 5% tol.	6225-E	Allen Bradley EB6225
R823	470	4711-E	Allen Bradley EB4711
R824	500, ½watt pot, wire wound	9122-84	Bourns 3067P-1-501
TRANSFORMER:			
T801	Transformer, special	8574A	Kay Electric Co.

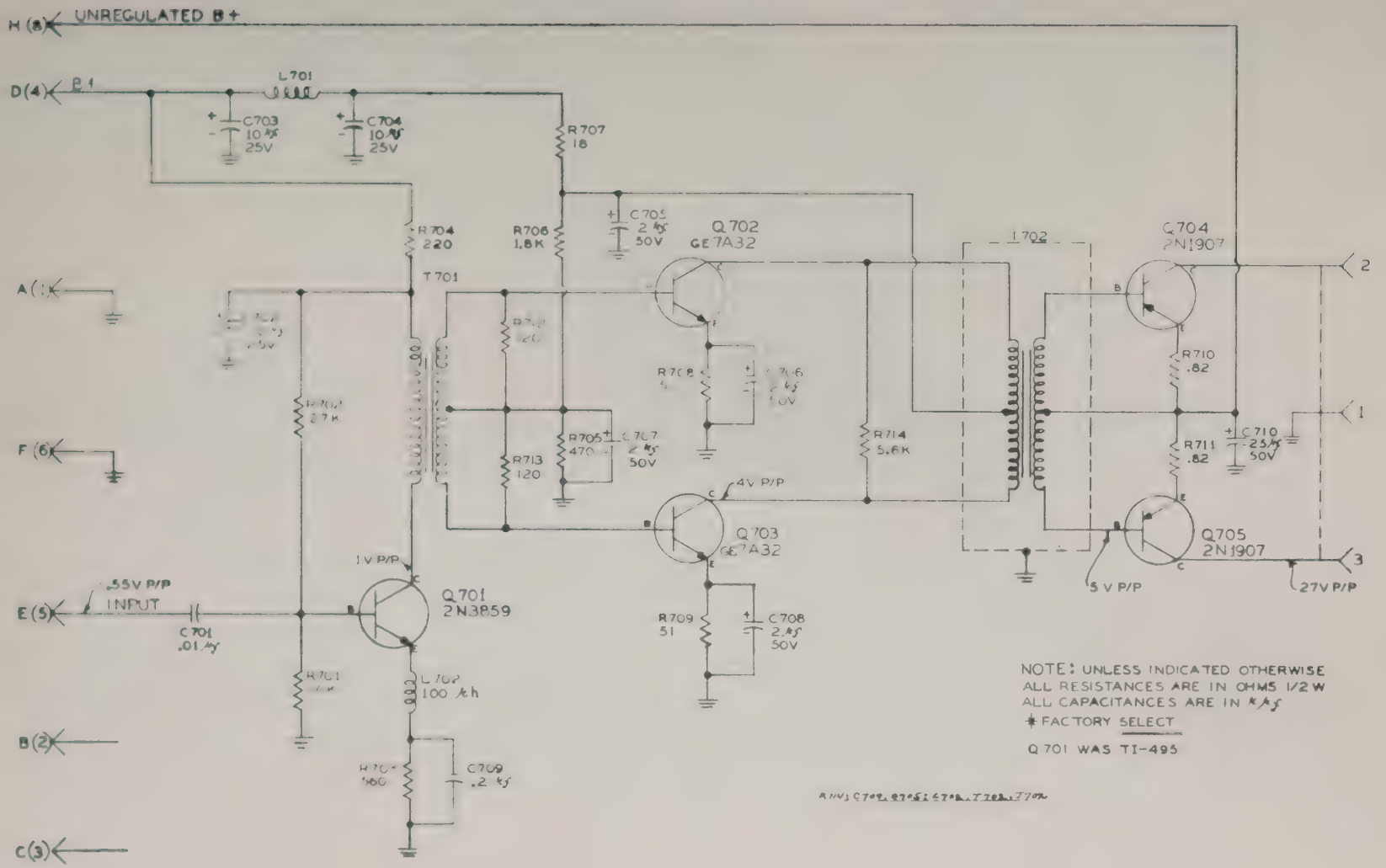
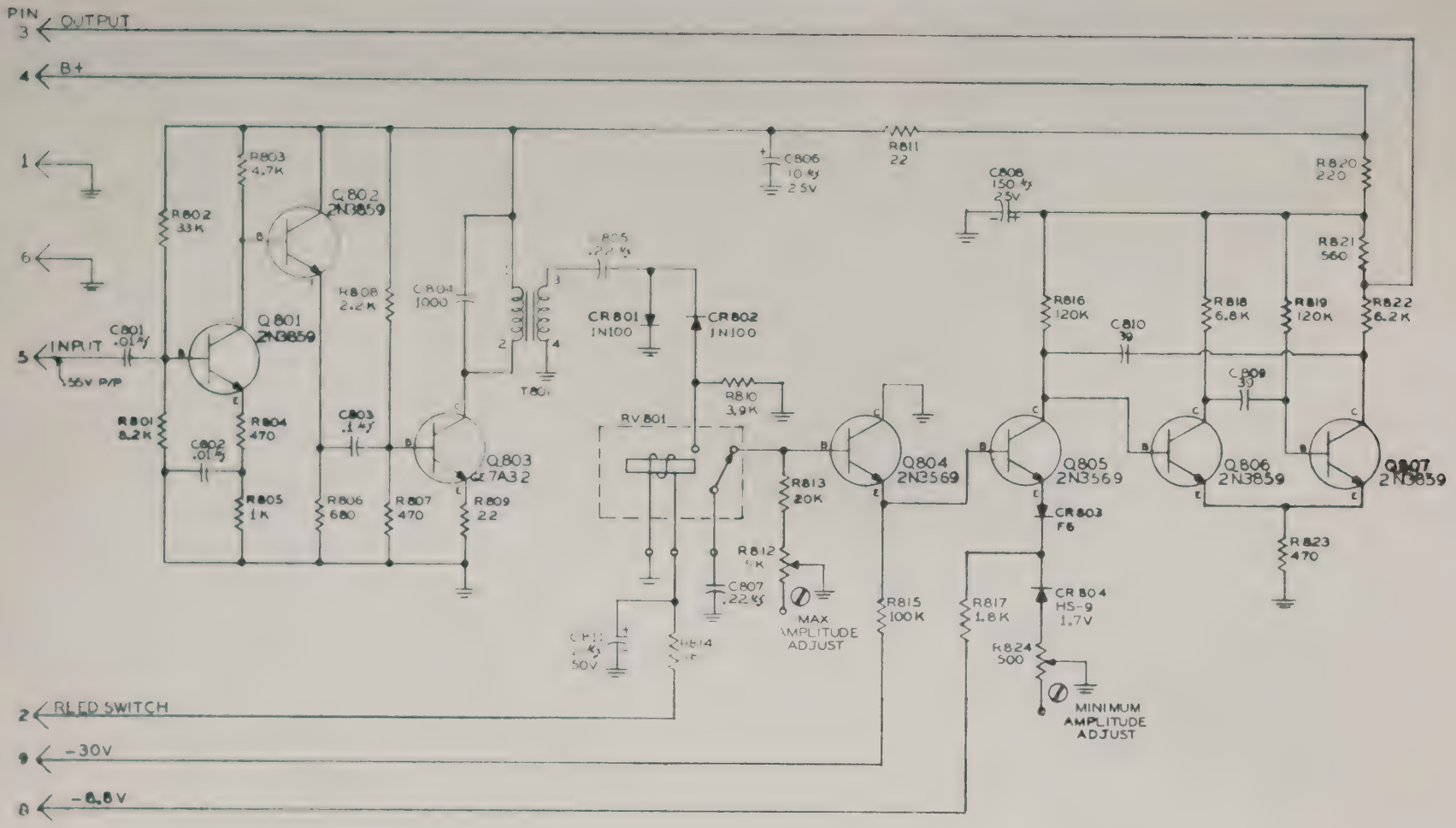


FIGURE 3.11 SCHEMATIC, MODULE #7, B7762D

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
J10	Recept., 24 contacts	6909-21	Amphenol 26-4407-24S
J11	Recept., 24 contacts	6909-17	Amphenol 26-190-24
J12	Recept., 8 contacts	253	Amphenol 77MIP
J13	Recept., phone	4212	Switch craft 12A
PLUGS:			
P1	Part of Printed board	#7756	
P2	Part of Printed board	#7757	
P3	Part of Printed board	#7758	
P4	Part of Printed board	#7759	
P5	Part of Printed board	#7760	
P6	Part of Printed board	#7761	
P7	Not Used	-	
P8	Part of Printed board	#7763	
P9	Male, 8 contacts	6909-15	Amphenol 26-182
P10	Plug, 24 contacts	6909-24	Amphenol 26-4507-24P
P11	Male, 24 contacts	6909-9	Amphenol 26-159-24
P12	Male, 8 contacts	920	Amphenol 86-CP8
RESISTORS:			
R1	1K, 2 watt pot	9122-20	Allen Bradley JA2N048P102UE
R2	1K, 2 watt pot with S10	9122-88	Allen Bradley JS2N048P102UE
R3	50, 2 watt pot	9122-1	Allen Bradley JA2N048S500UE
R4	10K, 2 DB step pot	8707	Daven CP354-M-H4
R5	10K, 2 DB step pot	8707	Daven CP354-M-H4
R6	10K, 2 watt pot	9122-31	Allen Bradley JA2N048S103UE
R7	Factory Selected	-	-
R8	220, ½watt	2211-E	Allen Bradley EB2211
R9	10K, 75 watt, wire wound	911B	Kay Electric Co.
R10	2.2M, ½watt	2251-E	Allen Bradley EB2251
R11	82, ½watt	8201-E	Allen Bradley EB8201
R12	2, 10 watt, wire wound	2P01-K	Ohmite 1705
R13	25K, 10 watt, wire wound	2531-K	Ohmite 1767
R14	2.2K, ½watt	2221-E	Allen Bradley EB2221

PARTS LIST, DETAIL PARTS

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
CAPACITORS:			
C1	680μμf, 500V., silver mica	6359-80	Elmenco DM16-681
C2	Factory Selected	-	-
C3	5μf, 220 V. AC	906	Aerovox P129F28
C4	1500μf, 50V., Electrolytic	6355-115	Mallory WP-068
C5	3000μf, 50V., Electrolytic	6355-120	Cornell Dubilier FB5030
C6	250μf, 50V., Electrolytic	6355-72	Cornell Dubilier BR250-50
FUSE:			
F1	Fuse, 3 amp, 250V.	245	Littelfuse 312003
LAMPS:			
I1	Lamp, 7V., screw base	8644	Drake #765
I2	Lamp, NE 2	7144	General Electric NE 2
DIODE:			
CR1	Diode, Silicon, F6	6357-3	Sarkes Tarzian F6
JACKS:			
J1	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J2	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J3	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J4	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J5	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J6	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J7	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J8	Recept., 15 contacts	6909-22	Amphenol 143-015-01
J9	Recept., 15 contacts	6909-22	Amphenol 143-015-01



NOTE: UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS 1/2W
ALL CAPACITANCES ARE IN µµf

Q801, Q802 WERE: TI-494
Q804, Q805, Q806, Q807, WERE TI-495

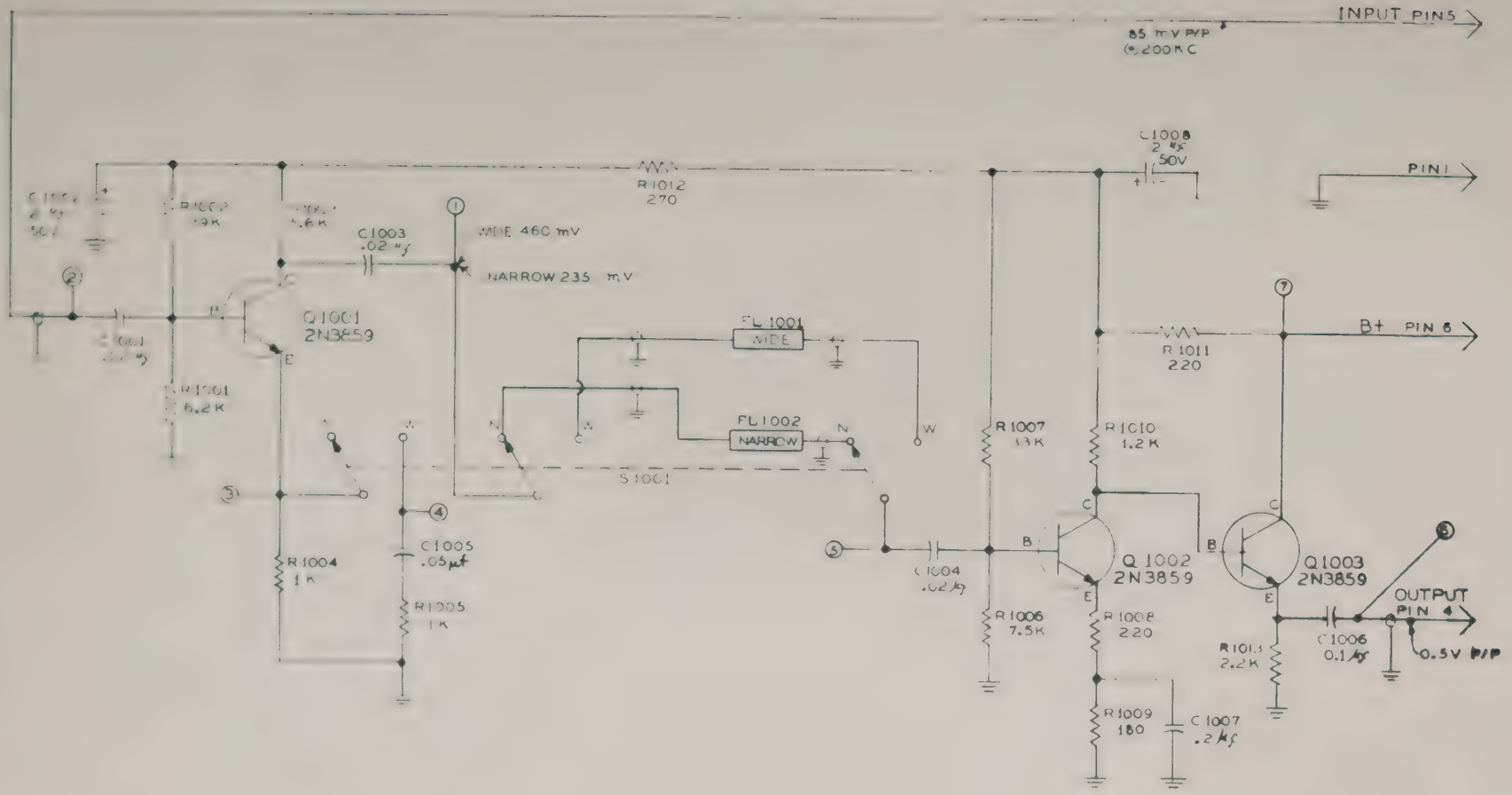
R824
C811
T801
RV801
CR804
& B47

FIGURE 3.12 SCHEMATIC, MODULE #8, B7763D

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
SWITCHES:			
S1	Toggle, SPDT	255-A	A-H&H 21350
S2	Microswitch	7409	Unimax BZ-2RM22
S3	Rotary, 1 wafer, 3 pos.	8589	Kay Electric Co.
S4	Rotary, 1 wafer, 3 pos.	446	Kay Electric Co.
S5	Rotary, 1 wafer, 2 pos.	176	Kay Electric Co.
S6	Toggle, momentary, DPDT	256-A	A-H&H 21858X
S7	Rotary, 1 wafer, 2 pos.	176	Kay Electric Co.
S8	Toggle, DPDT	254-A	A-H&H 81027-CE
S9	Rotary, 2 wafer, 2 pos.	445	Kay Electric Co.
S10	Rotary, SPST/see R2	-	-
S11	Reed Switch Block	8128	Kay Electric Co.
S12	Microswitch	7409	Unimax BZ-2RM22
TRANSFORMERS:			
T1	Special, Hi Voltage	8655	Kay Electric Co.
T2	Audio, Output	8581	Thordarson TR62
TRANSISTOR:			
Q1	2N3055	K174	RCA 2N3055
M1	Meter, VU	1431	Kay Electric Co.
SP1	Speaker 5"	1003	Cletron PM5C
TJ14-26	Test Jacks	8637	Alden 9462

PARTS LIST, POWER SUPPLY BOARD

CAPACITORS:			
C901	Not Used	-	-
C902	50μf, 50V., Electrolytic	6355-114	Cornell Dubilier Type NLW
C903	Not Used	-	-
C904	Not Used	-	-
C905	50μf, 50V., Electrolytic	6355-114	Cornell Dubilier Type NLW
C906	50μf, 50V., Electrolytic	6355-114	Cornell Dubilier Type NLW
C907	50μf, 25V., Electrolytic	6355-113	Sprague 40D506FO25DF3
C908	Not Used	-	-
DIODES:			
CR901 thru CR904	Diode, Silicon, IN1115	6357-72	Motorola IN1115
CR905 thru CR908	Diode, Silicon, F6	6357-3	Sparkes Tarzian F6
CR909 & CR910	Diode, Zener, ½M6.8Z10	6357-23	Motorola ½M6.8Z10
CR911	Diode, Zener, IN3689	6357-65	Motorola 3/4M27Z10
FUSES:			
F901	Fuse, 1.5amp. slow/blow	6908-6	Littel Fuse Co. 313 3AG
F902	Fuse, 1.5 amp. slow/blow	6908-6	Littel Fuse Co. 313 3AG
LAMP:			
I901	Lamp, pilot, 7 volt	8644	Drake 765
CONNECTOR:			
J901	Connector, Jack	6909-23	Hubbel 7484
P901	Connector, Receptacle	4116	Hubbel 7486



NOTE: UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS 1/4 W
ALL CAPACITANCES ARE IN µµf
* FACTORY SELECT
④ THIS INDICATES EGRESS HOLES FOR WIRING

Q1001, Q1002 WERE TI 495
Q1003, WAS TI-494

R1013; C1008; Q1003.

FIGURE 3.13 SCHEMATIC, FILTER PLUG-IN, B8617

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
P902	Plug, AC Line 3 prong	7166	Royal KS1539
TRANSISTORS:			
Q901	Transistor, GE7A32	K147	General Electric 4JD7A32
Q902	Transistor, 2N3859	K172	General Electric 2N3859
Q903	Transistor, 2N2339	K146	RCA 2N2339
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)			
R901	2.2K	2221-E	Allen Bradley EB2221
R902	10K	1031-E	Allen Bradley EB1031
R903	5.6K	5621-E	Allen Bradley EB5621
R904	1K	1021-E	Allen Bradley EB1021
R905	1K, 1 watt pot, wire wound	9122-82	IRC Type 100-1
R906	1K	1021-E	Allen Bradley EB1021
R907	470	4711-E	Allen Bradley EB4711
R908	1.5K, 1 watt	1521-G	Allen Bradley GB1521
S901	Switch, toggle, DPDT	254-A	A-H&H 81027-CE
T901	Transformer, power	8078-A	Kay Electric Co.

PARTS LIST, MECHANICAL SYSTEM

MISCELLANEOUS

B1	Motor, Drive	904TRS	Kay Electric Co.
B2	Motor, Blower	410	Kay Electric Co.
DS-1	Buzzer	951	Edwards 725
K1	Relay, DPDT	8665	Potter & Bromfield KM11D
PU-1	Record head	8645	Kay Electric Co.
PU-2	Erase head	923	Kay Electric Co.

PARTS LIST, FILTER PLUG-IN

CAPACITORS:

C1001	.02μf, 100V., Mylar-paper	6899-13	Elmenco 1DP-1-203
C1002	2μf, 50V., Electrolytic	6355-87	Sprague Type 40D
C1003	.02μf, 500V., Ceramic Disc	6360-7	Sprague 44C2
C1004	.02μf, 500V., Ceramic Disc	6360-7	Sprague 44C2
C1005	.05μf, 75V., Ceramic Disc	6360-16	Gulton K8000V. .05K
C1006	.1μf, 75V., Ceramic Disc	6360-17	Gulton K8000V., .1K
C1007	.2μf, 75V., Ceramic Disc	6360-9	Gulton K8000V., .2K
C1008	2μf, 50V., Electrolytic	6355-87	Sprague Type 40D

FILTERS:

FL1001	Filter, wide band	8360-2	Midland LA 22
FL1002	Filter, Narrow band	8360-1	Midland DA 21
P1001	Connector, plug, 8 contacts	6909-15	Amphenol 26-182

TRANSISTORS:

Q1001	Transistor, 2N3859	K-172	General Electric 2N3859
Q1002	Transistor, 2N3859	K-172	General Electric 2N3859
Q1003	Transistor, 2N3859	K-172	General Electric 2N3859

RESISTORS: (Unless otherwise specified, all components are fixed composition, ¼watt, 10% tolerance.)

R1001	6.2K, 5% tol.	6225-C	Allen Bradley CB6225
R1002	39K	3931-C	Allen Bradley CB3931
R1003	5.6K	5621-C	Allen Bradley CB5621
R1004	1K	1021-C	Allen Bradley CB1021

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
R1005	1K	1021-C	Allen Bradley CB1021
R1006	7.5K, 5% tol.	7525-C	Allen Bradley CB7525
R1007	33K	3331-C	Allen Bradley CB3331
R1008	220	2211-C	Allen Bradley CB2211
R1009	180	1811-C	Allen Bradley CB1811
R1010	1.2K	1221-C	Allen Bradley CB1221
R1011	220	2211-C	Allen Bradley CB2211
R1012	270	2711-C	Allen Bradley CB2711
R1013	2.2K	2221-C	Allen Bradley CB2221

PARTS LIST, VU METER BOARD

CR1201 thru CR1206	Diode, Silicon, F6	6357-3	Sarkes Tarzian F6
R1201	Resistor, 8.2K, ½watt, 10% tol.	8221-E	Allen Bradley EB8221

PARTS LIST, LOW PASS FILTER

CAPACITORS:

C1301	500μμf, 500V., Silver mica	6359-66	Elmenco DM15-501
C1302	.002μf, 600V., Mylar-paper	6899-4	Elmenco 6DP-1-202
C1303	.002μf, 600V., Mylar-paper	6899-4	Elmenco 6DP-1-202
C1304	.22μf, 50V., Mylar-paper	6411-1	Goodall 601PE
C1305	390μμf, 500V., Silver mica	6359-65	Elmenco DM15-391

COILS:

L1301	Coil, 1.5MH	6394-26	Miller 4664
L1302	Coil, 2.4MH	6394-27	Miller 4666
L1303	Coil, 1.5MH	6394-26	Miller 4664
R1301	Resistor, 1.3K ohm, 5% tol.	1325-E	Allen Bradley EB1325

PARTS LIST, RECORD-PREAMPLIFIER

CAPACITORS:

C1401	2μf, 50V., Electrolytic	6355-87	Sprague Type 40D
C1402	100μf, 6V., Electrolytic	6355-109	Sprague Type 40D
C1403	2μf, 50V., Electrolytic	6355-87	Sprague Type 40D
C1404	Not Used	6355-87	Sprague Type 40D
C1405	150μf, 25V., Electrolytic	6355-45	Int'l Elect. APD 116
J1401	Jack, phone	449	Switchcraft JK33A
Q1401	Transistor, 2N3859	K172	General Electric 2N3859

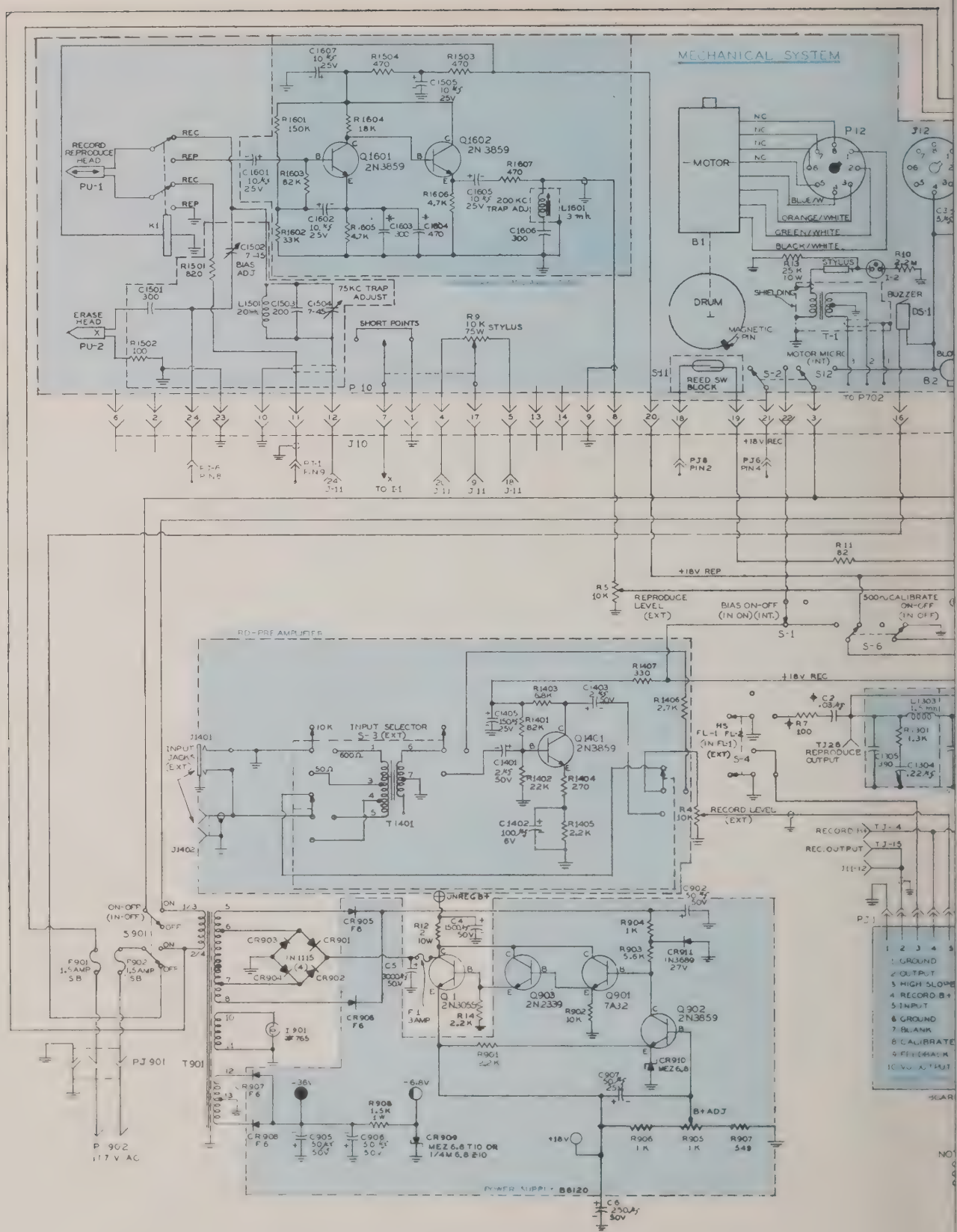
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)

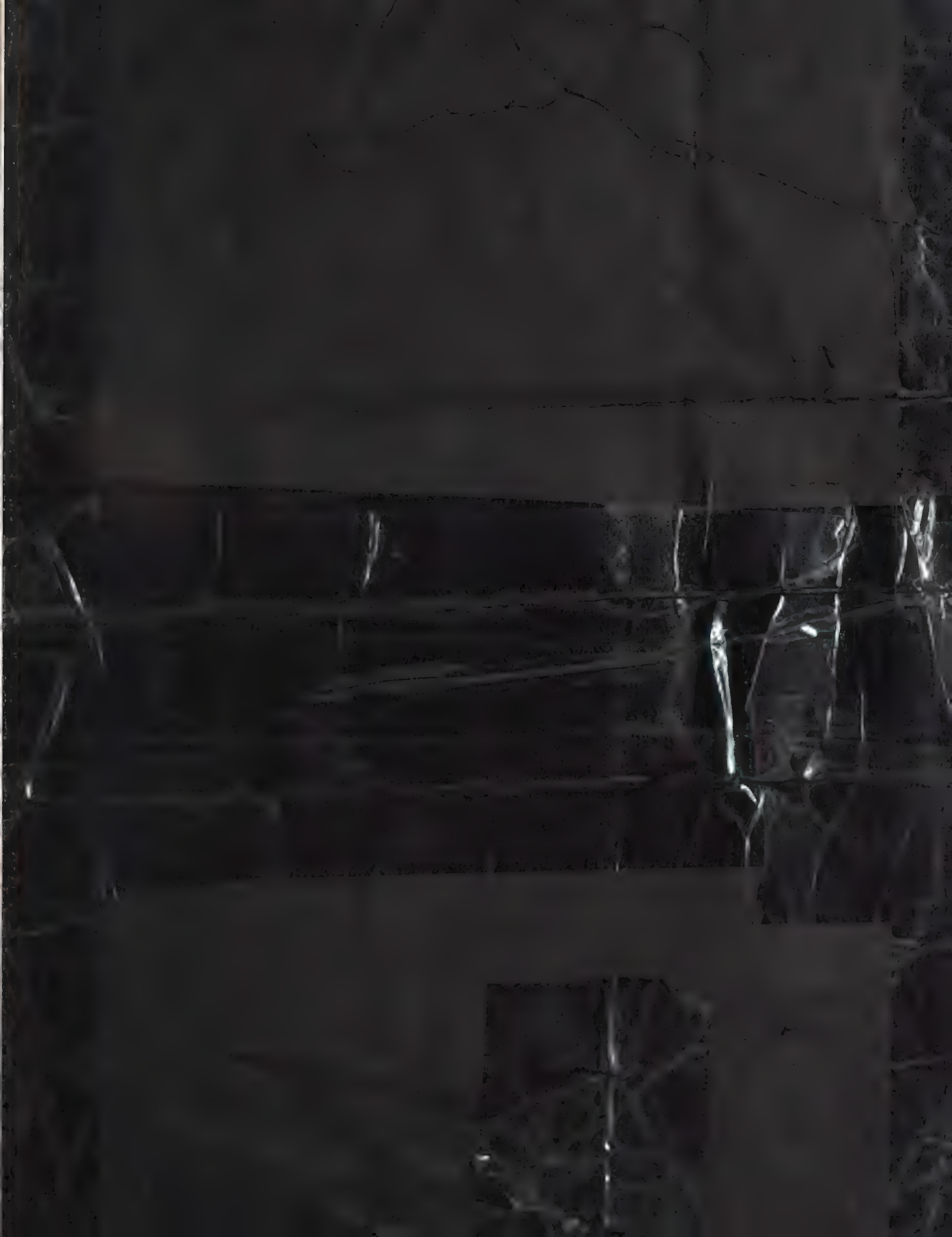
R1401	82K	8231-E	Allen Bradley EB8231
R1402	22K	2231-E	Allen Bradley EB2231
R1403	6.8K	6821-E	Allen Bradley EB6821
R1404	270	2711-E	Allen Bradley EB2711
R1405	2.2K	2221-E	Allen Bradley EB2221
R1406	2.7K	2721-E	Allen Bradley EB2721
R1407	330	3311-E	Allen Bradley EB3311
T1401	Transformer, matching	8582	UTC O-2

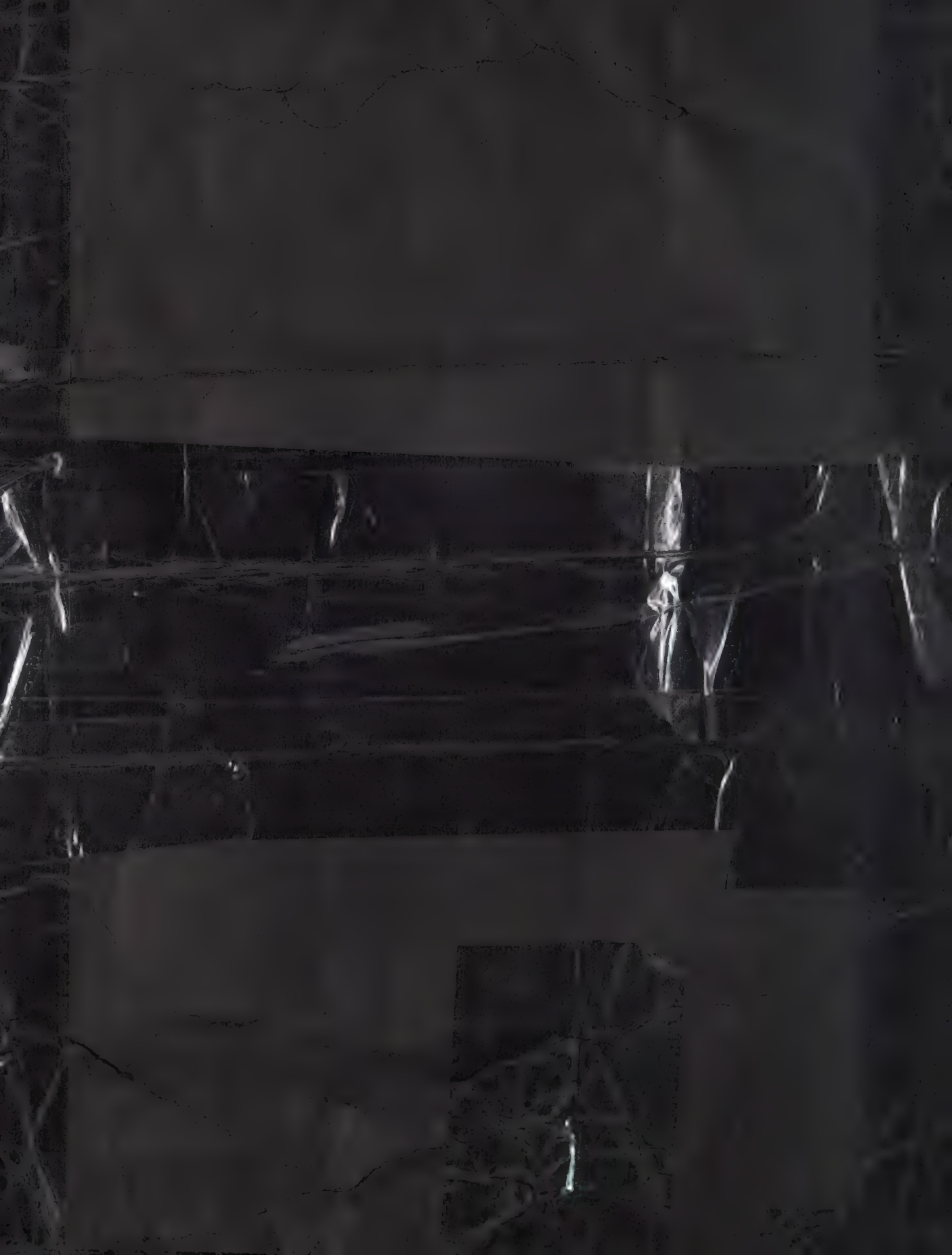
PARTS LIST, BIAS ADJUST BOARD

CAPACITORS:

C1301	300μμf, 500V., Silver mica	6359-64	Elmenco DM15-301
C1302	7-45μμf, Ceramic Trimmer	6358-7	Erie 503000 D2PO 33R
C1305	200μμf, 500V., Silver mica	6359-63	Elmenco DM15-201
C1304	7-45μμf, Ceramic Trimmer	6358-7	Erie 503000 D2PO 33R


MECHANICAL SYSTEM
RECORD REPRODUCE HEAD
PU-1
ERASE HEAD
PU-2
REC
REP
K1
BIAS ADJ
75KC TRAP ADJUST
SHORT POINTS
R9 10K 75W STYLUS
P 10
J10
TO I-1
MOTOR
P12
J12
NC
BLUE/W
ORANGE/WHITE
GREEN/WHITE
BLACK/WHITE
STYLUS
SHIELDING
BUZZER
DS-1
DRUM
MAGNETIC PIN
REED SW BLOCK
MOTOR MICRO (INT)
TO P702
+18V REC
+18V REP
REPRODUCE LEVEL (EXT)
BIAS ON-OFF (IN ON) (INT.)
500~ CALIBRATE ON-OFF (IN OFF)
RD-PREAMPLIFIER
INPUT SELECTOR S-3 (EXT)
INPUT JACKS (EXT)
RECORD LEVEL (EXT)
REC. OUTPUT
REPRODUCE OUTPUT
ON-OFF (IN-OFF)
S 901
F901 1.5 AMP SB
F902 1.5 AMP SB
PJ 901
P 902 117 V AC
T901
CR903 CR901 CR904 CR902 IN1115 (4)
CR905 F6
CR906 F6
CR907 F6
CR908 F6
CR909 MEZ 6.8 TIO OR 1/4M 6.8 E10
CR910 MEZ6.8
CR911 1N3689 27V
Q1 2N3055
Q901 7A32
Q902 2N3859
Q903 2N2339
Q1401 2N3859
Q1602 2N3859
F1 3AMP
I 901 765
-36V
-6.8V
B+ADJ
+18V
POWER SUPPLY B8120
1 GROUND
2 OUTPUT
3 HIGH SLOPE
4 RECORD B+
5 INPUT
6 GROUND
7 BLANK
8 CALIBRATE
9 FEEDBACK
10 VOLT OUTPUT





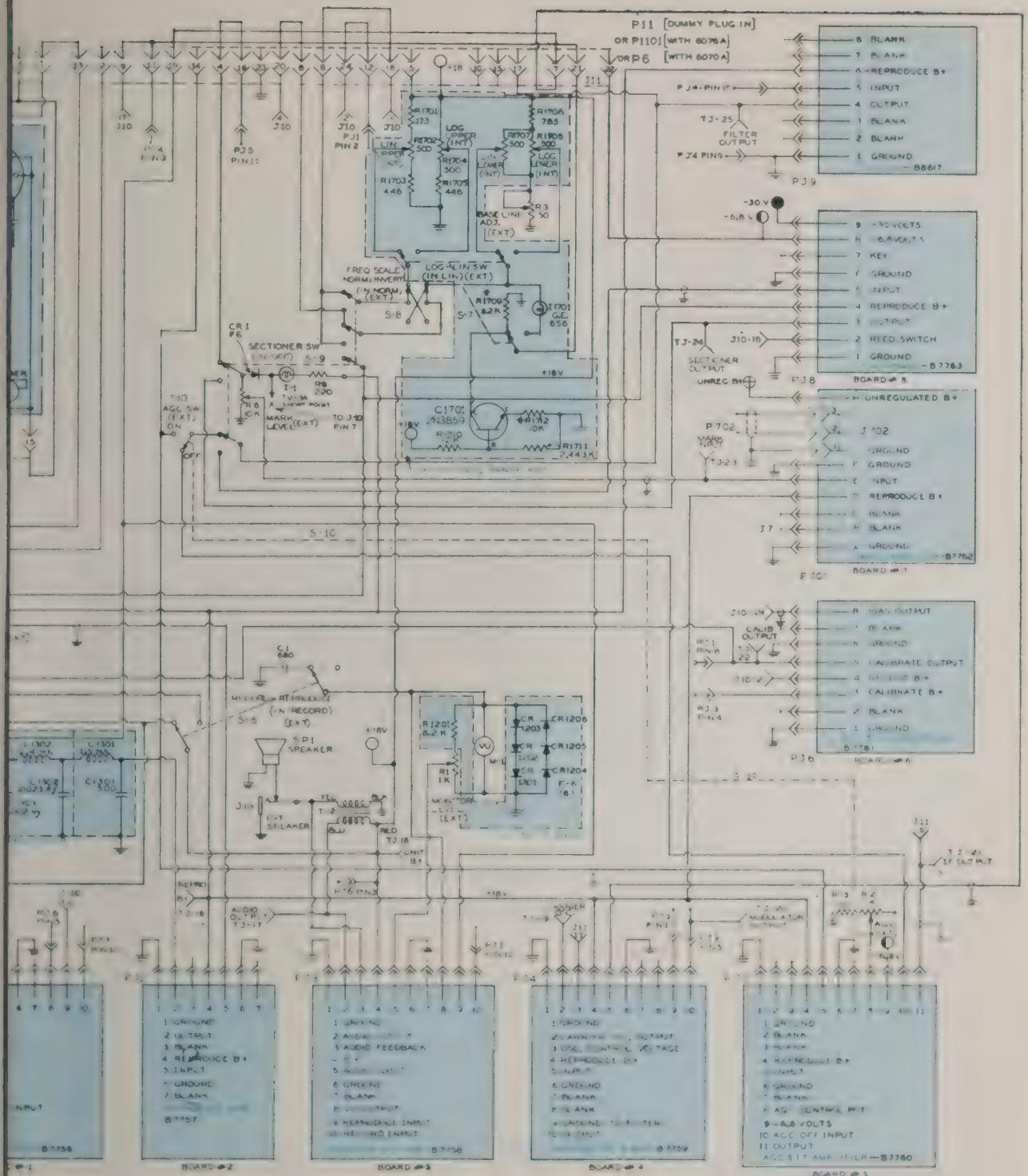


FIGURE 3.14 SCHEMATIC, SONA-GRAPH 6061-A, D8660N

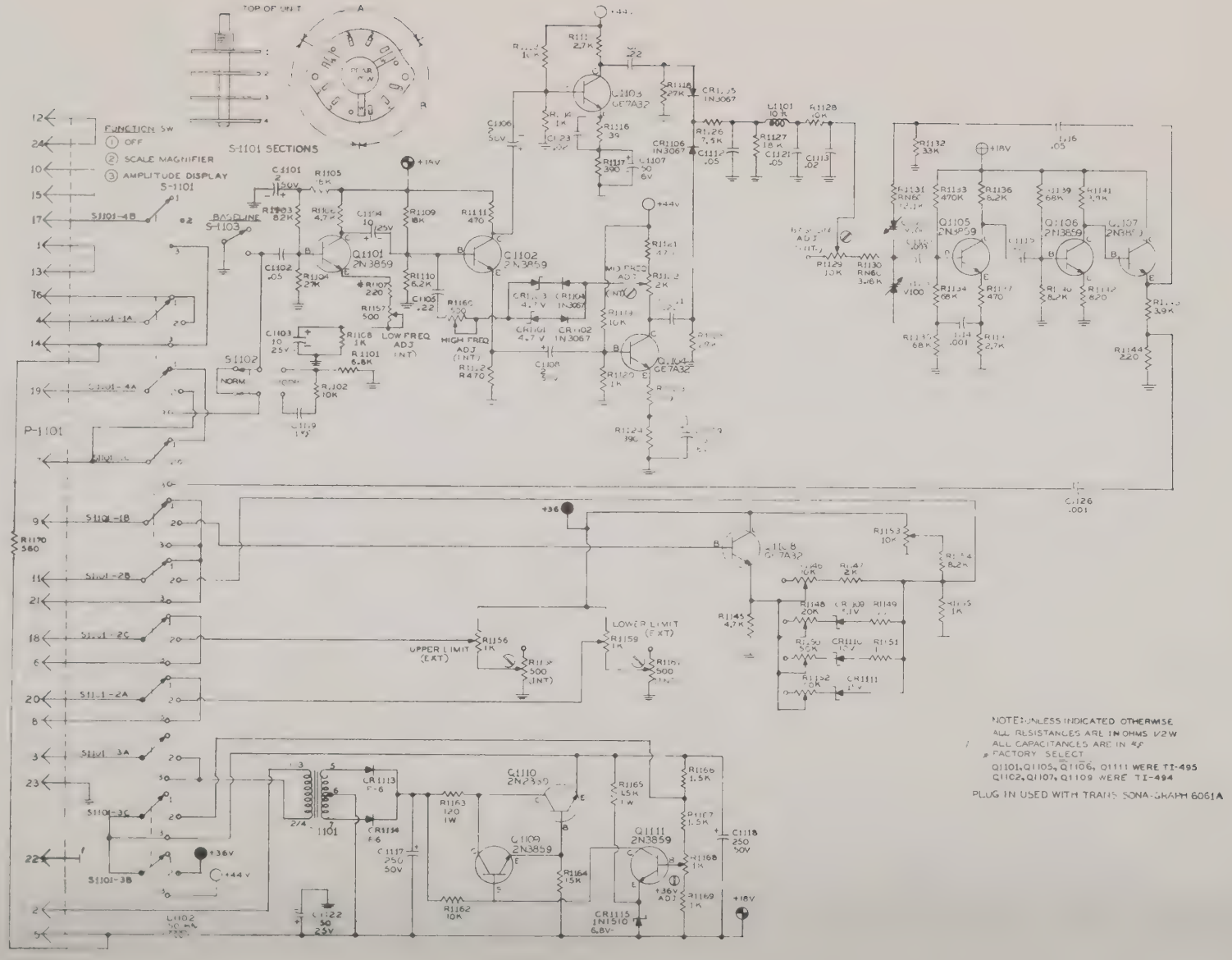


FIGURE 3.15 SCHEMATIC, AMPLITUDE DISPLAY, SCALE MAGNIFIER, 6076-A, C8957E

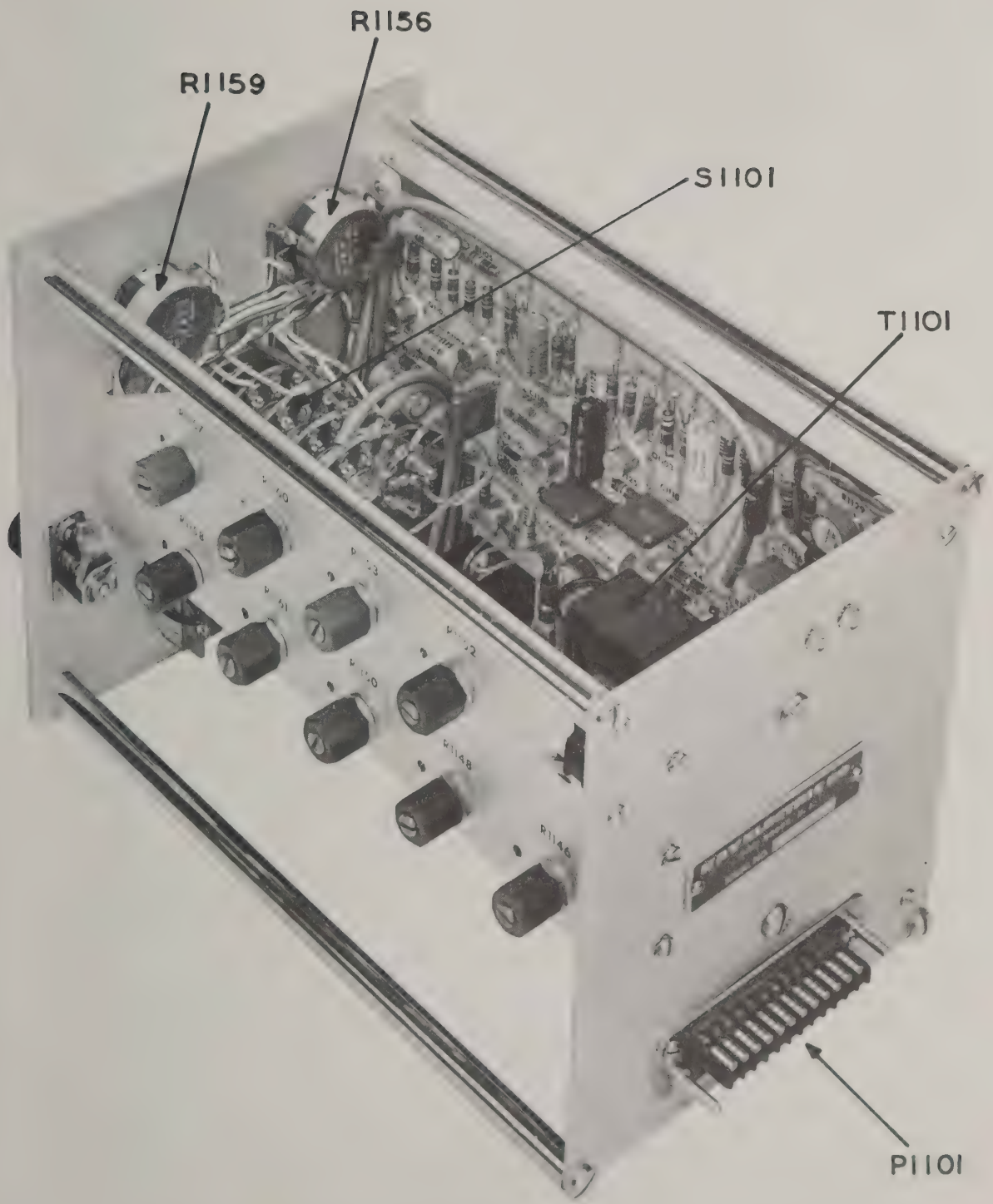


FIGURE 3.16 AMPLITUDE DISPLAY AND SCALE MAGNIFIER

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
L1501	Coil, 20MH Torocoil	1719	Kay Electric Co.
R1501	Resistor, 820, ½watt	8211-E	Allen Bradley EB8211
R1502	Resistor, 100, ½watt	1011-E	Allen Bradley EB1011

PARTS LIST, REPRODUCE- PREAMPLIFIER

CAPACITORS:

C1601	10μf, 25V., Electrolytic	6355-94	Sprague Type 40D
C1602	10μf, 25V., Electrolytic	6355-94	Sprague Type 40D
C1603	Factory Selected	6355-94	Sprague Type 40D
C1604	Factory Selected	6355-94	Sprague Type 40D
C1605	10μf, 25V., Electrolytic	6355-94	Sprague Type 40D
C1606	300μμf, 500V., Silver mica	6355-64	Elmenco DM15-301
C1607	10μf, 25V., Electrolytic	6355-94	Sprague Type 40D
L1601	Coil, 3MH, Choke	8580	Wells Electric 387-3000
Q1601	Transistor, 2N3859	K172	General Electric 2N3859
Q1602	Transistor, 2N3859	K172	General Electric 2N3859

RESISTORS:

R1601	150K, ½watt	1541-E	Allen Bradley EB1541
R1602	33K, ½watt	3331-E	Allen Bradley EB3331
R1603	82K, ½watt	8231-E	Allen Bradley EB8231
R1604	18K, ½watt	1831-E	Allen Bradley EB1831
R1605	4.7K, ½watt	4721-E	Allen Bradley EB4721
R1606	4.7K, ½watt	4721-E	Allen Bradley EB4721
R1607	470, ½watt	4711-E	Allen Bradley EB4711

PARTS LIST, LOG-LIN BOARD

I1701	Light, 6 watt, 120V.,		General Electric 656

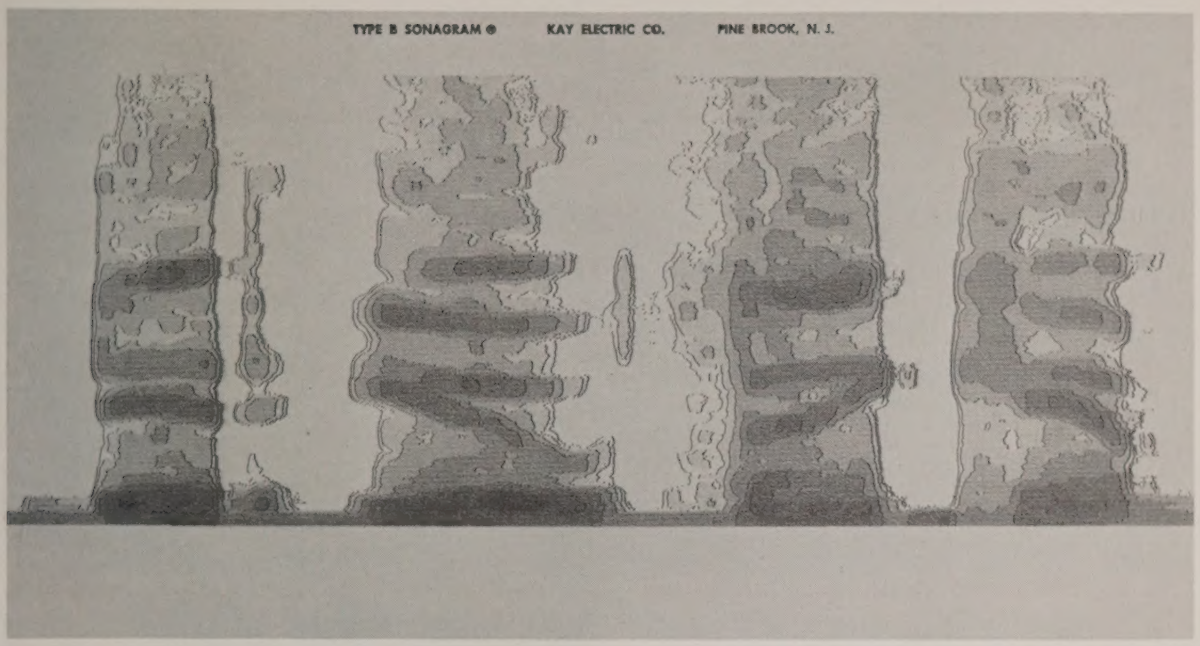
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)

R1701	173, ¼watt, 1% tol.	6558-32	Mepco C10-173
R1702	500, ½watt pot, wire wound	9122-84	Bourns 3067S-1-501
R1703	446, ¼watt, 1% tol.	6558-88	Mepco C10-446
R1704	500, ½watt pot, wire wound	9122-84	Bourns 3067S-1-501
R1705	446, ¼watt, 1% tol.	6558-88	Mepco C10-446
R1706	785, ¼watt, 1% tol.	6558-48	Mepco C10-785
R1707	500, ½watt pot, wire wound	9122-84	Bourns 3067S-1-501
R1708	500, ½watt pot, wire wound	9122-84	Bourns 3067S-1-501
R1709	Factory Selected	-	-
R1710	12K	1231-E	Allen Bradley EB1231
R1711	2.443K, ¼watt, 1% tol.	6558-206	Mepco C10-2443
R1712	Factory Selected	-	-
Q1701	Transistor, 2N3859	K172	General Electric 2N3859

PARTS LIST, AMPLITUDE DISPLAY & SCALE MAGNIFIER

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
CAPACITORS: (all capacitors in μμf, 500 volts, unless otherwise indicated)			
C1101 & C1102	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C1103	Not Used	-	-
C1104	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C1105	0.22μf, 50V., Mylar	6411-1	Goodall 601
C1106	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C1107	50μf, 6V., Electrolytic	6355-37	Pyramid Type MLV
C1108	2μf, 50V., Electrolytic	6355-87	Sprague 40D205F050CB3
C1109	50μf, 6V., Electrolytic	6355-37	Pyramid Type MLV
C1110 & C1111	0.22μf, 50V., Mylar	6411-1	Goodall 601
C1112	0.05μf, 100V., Mylar-paper	6899-1	Elmenco 1DP-2-503
C1113	0.02μf, 100V., Mylar-paper	6899-13	Elmenco 1DP-1-203
C1114	0.001μf, 600V., Mylar-paper	6899-10	Elmenco 6DP-1-102
C1115 & C1116	0.05μf, 75V., Ceramic Disc	6360-16	Gulton K8000V .05K
C1117 & C1118	250μf, 50V., Electrolytic	6355-72	Cornell Dubilier BR250-50S
C1119	1μf, 50V., Electrolytic	6355-93	Cornell Dubilier NLW-1-50
C1120	0.003μf, 600V., Mylar-paper	6899-15	Elmenco 6DP-1-302
C1121	0.05μf, 100V., Mylar-paper	6899-1	Elmenco 1DP-2-503
C1122	150μf, 25V., Electrolytic	6355-45	IEI ADP116
C1123	.02μf, 100V., Mylar-paper	6899-13	Elmenco 1DP-1-203
DIODES:			
CR1101	Diode, Zener, ½M5.1AZ5	6357-78	Motorola ½M5.1AZ5
CR1102	Diode, Silicom, IN3067	6357-75	Motorola IN 3067
CR1103	Diode, Zener, ½M5.1AZ5	6357-78	Motorola ½M5.1AZ5
CR1104, 1105, 1106	Diode, Silicon, IN3067	6357-75	Motorola IN3067
CR1107 & CR1108	Diode, Varactor, V100	6357-84	PSI V100
CR1109	Diode, Zener, ½M5.1AZ5	6357-78	Motorola ½M5.1AZ5
CR1110	Diode, Zener, IN4104	6357-79	Motorola ½M10Z5
CR1111	Diode, Zener, IN4109	6357-24	Motorola ½M15Z5
CR1112	Not Used	-	-
CR1113 & CR1114	Diode, Silicon, F6	6357-3	Sarkes Tarzian F6
CR1115	Diode, Zener, IN1510	6357-7	IRC MZ6.8
COILS:			
L1101	Choke, 8HY	6394-24	UTC SSO-23
L1102	Choke, 50MH	6394-31	Caddell Burns 602-3
CONNECTORS:			
P1101	Connector, 24 contacts	6909-9	Amphenol 26-159-24
TRANSISTORS:			
Q1101	Transistor, 2N3859	K172	General Electric 2N3859
Q1102	Transistor, 2N3859	K172	General Electric 2N3859
Q1103 & Q1104	Transistor, 4JD7A32	K147	General Electric 4JD7A32
Q1105 & Q1106	Transistor, 2N3859	K172	General Electric 2N3859
Q1107	Transistor, 2N3859	K172	General Electric 2N3859
Q1108	Transistor, 4JD7A32	K147	General Electric 4JD7A32
Q1109	Transistor, 2N3859	K172	General Electric 2N3859
Q1110	Transistor, 2N2339	K146	RCA 2N2339
Q1111	Transistor, 2N3859	K172	General Electric 2N3859
RESISTORS: (Unless otherwise specified, all components are fixed composition, ½watt, 10% tolerance.)			
R1101	6.8K	6821-E	Allen Bradley EB6821
R1102	10K	1031-E	Allen Bradley EB1031
R1103	82K	8231-E	Allen Bradley EB8231
R1104	27K	2731-E	Allen Bradley EB2731
R1105	18K	1831-E	Allen Bradley EB1831
R1106	4.7K	4721-E	Allen Bradley EB4721
R1107	10	1001-E	Allen Bradley EB1001
R1108	1.8K	1821-E	Allen Bradley EB1821
R1109	18K	1831-E	Allen Bradley EB1831
R1110	6.2K, 5% tol.	6225-E	Allen Bradley EB6225

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MANUFACTURER & PART NO.
R1111 & R1112	470	4711-E	Allen Bradley EB4711
R1113	10K	1031-E	Allen Bradley EB1031
R1114	1K	1021-E	Allen Bradley EB1021
R1115	2.7K	2721-E	Allen Bradley EB2721
R1116	18	1801-E	Allen Bradley EB1801
R1117	390	3911-E	Allen Bradley EB3911
R1118	27K	2731-E	Allen Bradley EB2731
R1119	10K, 1 watt, wire wound	9122-79	IRC Type 100-1
R1120	1K	1021-E	Allen Bradley EB1021
R1121	680	6811-E	Allen Bradley EB6811
R1122	2K, ½watt pot, wire wound	9122-80	Bourns 3067P-1-202-2K
R1123	18	1801-E	Allen Bradley EB1801
R1124	390	3911-E	Allen Bradley EB3911
R1125	27K	2731-E	Allen Bradley EB2731
R1126	4.7K	4721-E	Allen Bradley EB4721
R1127	30K, 5% tol.	3035-E	Allen Bradley EB3035
R1128	10K	1031-E	Allen Bradley EB1031
R1129	10K, 1 watt pot, wire wound	9122-79	IRC Type 100-1
R1130	3.16K, 1/8 watt, 1% tol.	6558-247	Mepco Type EP-12
R1131	5.62K, 1/8 watt, 1% tol.	6558-248	Mepco Type EP-12
R1132	33K	3331-E	Allen Bradley EB3331
R1133	470K	4741-E	Allen Bradley EB4741
R1134	68K	6831-E	Allen Bradley EB6831
R1135	68K	6831-E	Allen Bradley EB6831
R1136	8.2K	8221-E	Allen Bradley EB8221
R1137	470	4711-E	Allen Bradley EB4711
R1138	2.7K	2721-E	Allen Bradley EB2721
R1139	68K	6831-E	Allen Bradley EB6831
R1140	8.2K	8221-E	Allen Bradley EB8221
R1141	3.9K	3921-E	Allen Bradley EB3921
R1142	820	8211-E	Allen Bradley EB8211
R1143	3.9K	3921-E	Allen Bradley EB3921
R1144	220	2211-E	Allen Bradley EB2211
R1145	4.7K	4721-E	Allen Bradley EB4721
R1146	10K, 2 watt pot, variable	9122-31	Allen Bradley JA2N048S103UE
R1147	2K, 5% tol.	2025-E	Allen Bradley EB2025
R1148	20K, 2 watt pot, variable	9122-37	Allen Bradley JA2N048S203UE
R1149	10	1001-E	Allen Bradley EB1001
R1150	50K, 2 watt pot, variable	9122-44	Allen Bradley JA2N048S503UE
R1151	10	1001-E	Allen Bradley EB1001
R1152	50K, 2 watt pot, variable	9122-44	Allen Bradley JA2N048S503UE
R1153	10K, 2 watt pot, variable	9122-31	Allen Bradley JA2N048S103UE
R1154	8.2K	8221-E	Allen Bradley EB8221
R1155	1K	1021-E	Allen Bradley EB1021
R1156	1K, 2 watt pot, wire wound	9122-81	Clarostat 43CI-IK
R1157	Not Used	-	-
R1158	500, 2 watt pot, variable	9122-16	Allen Bradley JA2N048S501UE
R1159	1K, 2 watt pot, wire wound	9122-81	Clarostat 43CI-IK
R1160	Not Used	-	-
R1161	500, 2 watt pot, variable	9122-16	Allen Bradley JA2N048S501UE
R1162	10K	1031-E	Allen Bradley EB1031
R1163	120, 1 watt	1211-G	Allen Bradley GB1211
R1164	15K	1531-E	Allen Bradley EB1531
R1165	1.5K, 1 watt	1521-G	Allen Bradley GB1521
R1166 & R1167	1.5K	1521-E	Allen Bradley EB1521
R1168	1K, 1 watt pot, wire wound	9122-82	IRC Type 100-1
R1169	1K	1021-E	Allen Bradley EB1021
SWITCHES:			
S1101	Switch, Rotary, 4 wafer, 3 pos.	8838	Kay Electric Co.
S1102	Switch, Toggle, DPDT	254-A	A-H & H 81027-CE
S1103	Switch, Toggle, DPDT	256-A	A-H & H 21858X
TRANSFORMER:			
T1101	Transformer, power	A8195A	Kay Electric Co.



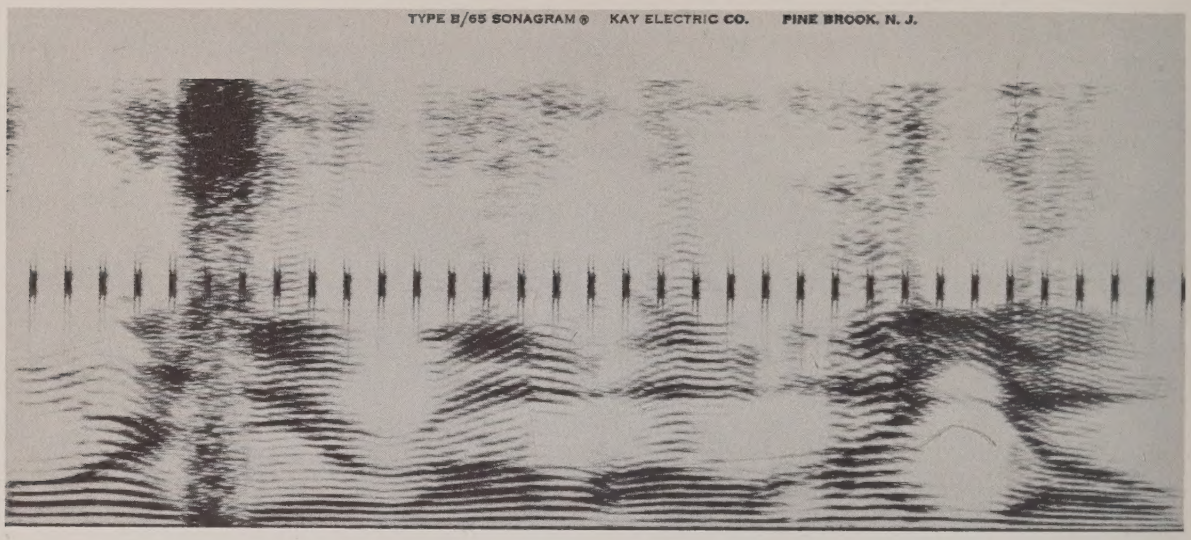
6070A

The 6070A Contour Display Unit has been recently designed for use with the 6061-A Sona-Graph as a compact plug-in accessory which may be purchased with the main unit or added at a later date as required. It converts the marking signals of the 6061-A unit to provide a second three dimensional display in addition to the conventional Sonagram. Clearly defined contour lines at 6DB intervals provide greater visual range of amplitude discrimination. Gradations in shading correlated with the rise and fall of signal level in 6DB steps provide a meaningful and easily readable contour pattern.

Interchangeable with the 6076-A plug-in, the 6070-A is a rugged, solid-state unit which makes the 6061-A a most versatile spectrum analyzer. It's a high-grade, glass-epoxy modular construction permits rapid removal of subcircuits for inspection and maintenance.

DYNAMIC RANGE: 42DB
CONTOUR LINE SPACING: 6DB
MAX INFLECTION FREQUENCY: 25Hz
CONTOUR LINE WIDTH: Descending line width
wider than ascending line width

dimensions: 6 x 7 x 10
weight: 6 lbs.



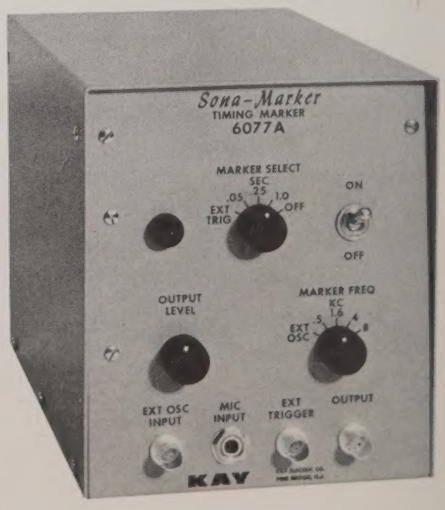
6077A

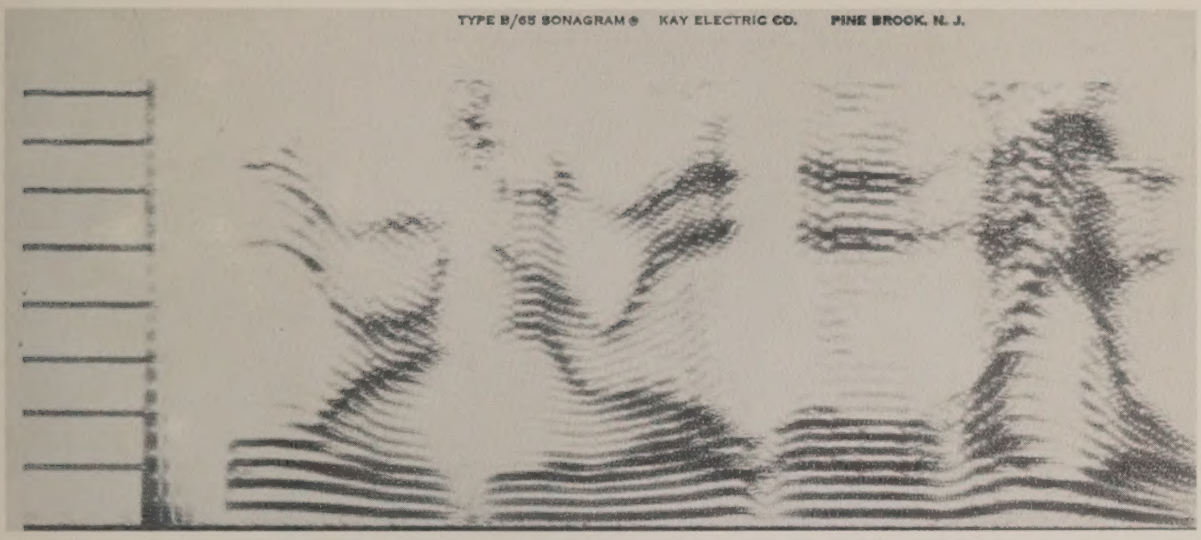
The 6077-A time-mark generator is designed for use with the 6061-A or 675 Analyzers primarily to correlate the time scale of the recorded display with the timing of the signal being analyzed. It will impose clear, sharp marks along the time base of the spectrogram at points controlled by signals synchronized with the signal under test. The unit may be triggered by individual pulses or a train of pulses, and by sine waves. Spacing as close as 30 ms are obtainable.

In addition, the 6077-A generates timed pulses at fixed intervals of .05, .25, and 1.0 sec. Variable spacing may be obtained by use of external oscillators or pulse generators. These signals may be used to mark the display record directly, or may be applied to tapes and used for synchronized time signals as above.

In order to provide the horizontally spaced markers at a convenient point on the record, variable vertical (frequency) positioning is provided.

VERTICAL (FREQUENCY) POSITIONING: INT.-.5, 1, 6, 4, 8 KHz, switchable
EXT.-0 to 20 KHz
INT. TIMING RANGE: .05, .25, 1.0 sec., switchable
EXT. TRIGGER INPUT: 0.6 V. Pk, pulse; 1.2 V. p/p min.
power supply: 117 V., 50/60 Hz.
dimensions: $6\frac{1}{2}$" x 5 5/8" x $10\frac{1}{2}$".
weight: $4\frac{1}{2}$ lbs.





6076A

The 6076-A is a solid-state plug-in designed for use with the 6061-A Sona-Graph. It performs two functions:

1. The Scale Magnifier section provides a full-pattern display of any desired portion of the Sona-Graph's 85-8000 Hz range; that is, both the upper and lower frequency limits may be controlled by the 6076-A and any desired frequency spread may be selected with a simple rotation of front panel controls.

2. The Amplitude Display function uses the average amplitude of the reproduced signal stored on the magnetic plating to provide an amplitude-vs-time Sonagram pattern, similar to the usual oscilloscope display. This appears on the same time scale as the analyzed signal.

FREQUENCY RANGE: Variable 0 to 8 KHz, full scale (Scale Magnification)
MAX. HEIGHT OF AMPLITUDE DISPLAY RECORD: $1\frac{1}{2}$" approx.
DYNAMIC RANGE OF AMPLITUDE DISPLAY: 24 or 34 DB, compressed
dimensions: 6" x 7" x 10".
weight: 5.3 lbs.